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Power Station Efficiency

THE returns published by the Electricity Commissioners under the title "Generation of Electricity in Great Britain" are probably the most carefully studied of all the excellent (so far as they go) official publications relating to supply undertakings. The latest document refers to the year ended December 31st, 1931, and appears more than a month earlier than its predecessor.

The information that excites the greatest interest is that relating to the thermal efficiency of coal-fired stations and coal consumed per kWh generated (it ought to be per kWh sent out, but that appears to be impracticable for the time being). The first is the more important, as low fuel consumption per kWh does not necessarily imply the use of the cheapest suitable coal (failing published data as to calorific value and cost per ton).

The "blue ribbon" this year goes to the Deptford West station of the London Electric Power Co., which has achieved the best performance yet obtained in this country of 24.02 per cent. It thus displaces the Kearsley station of the Lancashire Electric Power Co., although the latter has slightly improved on the figure of 23.84 per cent. with which it gained the honour last year. Kearsley still holds first place for fuel consumption per kWh, in spite of an increase from 1.17 lb. to 1.20 lb.

A sidelight on the unsuitability of the lb. of coal per kWh basis, which was once the general criterion, is that Deptford West comes only fourth in this category, being beaten by Portishead and North Tees, as well as by Kearsley. Barking easily heads the list of individual outputs with 611 million kWh, and, with Spondon, completes the 23 per cent. class. These stations all have outputs exceeding 100 million kWh, but only North Tees is among the forty-six with station load factors exceeding 50 per cent.—evidence enough that the plant load factors are higher than might appear.

Although the best figure for unit fuel consumption is less favourable than it was in 1930, the average figure for all steam stations is about 4.3 per cent. better, and the increased national output has been obtained for a total consumption of less coal than in the previous year.

Creditable as many of the results may be, we have only to compare the B.th.u. obtained per lb. of fuel by steam-turbine and by oil-engine stations to have an illuminating example of the inadequacy of the thermal standard. Out of 300 coal-fired stations eighteen have efficiencies of over 20 per cent., but out of 162 oil-engine stations no fewer than seventy-five. The Buxton Corporation station again puts up a fine record of 31.8 per cent., and 0.58 lb. of oil fuel per kWh.

Although we deprecate the placing of undue emphasis upon thermal efficiency, we are not of those who regard a few points either way as having a negligible effect on what the consumer has to pay. In negotiations for large power high load-factor contracts small fractions of a penny often turn the scale in favour of the public supply, and it is the industrial power consumers who have made possible, by increasing the scale on which electricity is produced, the low rates charged for all purposes. Still, what the consumer has to pay is the main thing.

Plant Orders Lacking

DEPUTISING for Lord Vaux of Harrowden as chairman of Monday's meeting of the Brush Electrical Engineering Company, Mr. F. R. Davenport felt compelled by circumstances to speak in less optimistic vein than seemed justifiable a year ago. The balance-sheet for 1931 showed a loss—the first for many years—chiefly due to lack of orders suited to the heavy engineering equipment. Extreme quietness prevailed in turbine business, both at home and overseas, and the preparations made in 1930 for providing 50,000- to 60,000-kW Brush-Ljungstrom units have not brought the anticipated reward yet. Indeed, Mr. Davenport stated that no plant orders of this size were placed in this country last year, but a 50,000-kW Ljungstrom plant put into service in Sweden early this year showed remarkable efficiency. Transformers were in

demand, and the department has been extended, but there was "intense competition," and very low prices prevailed; increasingly severe competition also dominated rolling-stock business. Briefly stated, the available trade fell far short of normal works capacity, staff reductions and other economies were made, and those at the helm can detect no signs of an early improvement in the general situation. Efforts are being made to develop new lines of engineering products, and the organisation is ready for revival when it comes. The works are being well maintained, the reserves are good, and a large connection of satisfied Brush consumers counts as a valuable asset.

Next Week's Convention

ALTHOUGH the annual convention of the Incorporated Municipal Electrical Association, to be held next week at Cardiff, will be shorn of two days of its usual period, indications are that it will be most instructvie and enjoyable. The fine Assembly Room of the City Hall in Cathays Park (referred to in an article this week on the Convention Area) will be the scene of all the indoor functions, including the reception by the President (Mr. C. G. Morley New) on Wednesday evening, the dinner and dance on Thursday, and the reading and discussion of the technical papers. The presidential address on Thursday morning will be followed by a paper on "The Organisation and Development of the Small Electricity Undertaking," by Mr. F. Newey, of Long Eaton, the afternoon being devoted to "Street Lighting," by Messrs. W. J. Jones, of E.L.M.A., and J. N. Waite, of Hull. There will be visits on Friday to Cardiff Castle (ladies only), the Wye Valley, and the works of the Whitehead Iron & Steel Co., and on Saturday to the Cardiff electricity works.

Power in Industry

In connection with the I.M.E.A. Convention at Cardiff next week

THE ELECTRICAL REVIEW

will publish a special "Power Number" designed throughout to bring before manufacturers of products of all descriptions the many services which electricity can render them. It will reach potential buyers of equipment for industrial purposes all over the country.

Super-conductivity

PROFESSOR J. C. MCLENNAN repeated at the Royal Institution the other night the notable experiment which he made some months ago at Toronto. He showed that a current induced in a lead ring will continue to flow if the ring be maintained at a very low temperature. For obtaining a low enough temperature (457 deg. F.) liquid helium was used. Conductance at temperatures of a few degrees above zero is governed by laws that are at present very obscure; it appears to increase exponentially in an extraordinary fashion. We hope that a pursuit of the line of thought indicated by this experiment will be continued at the cryogenic laboratory now being equipped at Cambridge. Such investigations may to some extent clear up our ignorance of what fundamentally causes resistance, and might also even lead to the evolution of conductors which at normal temperatures will have resistances very much lower than the best obtainable to-day.

No More Legislation Wanted

THE law has often been held to bear hardly on the owners of overhead lines, but a question asked in the House of Commons indicates that there are those who, so far from wishing to ease the burden of undertakings desirous of providing cheap electricity, would like to subject the growing numbers of street boxes and sub-stations to similar restrictions. Authorised undertakings are now permitted to place street boxes under public highways without payment and without limit as to size, but not above the ground if the road authority objects; surely this is a sufficient safeguard of public and private interests. Mr. Pybus was unsympathetic towards the desire expressed for further legislation on the subject, and so we are, fortunately, to be spared the introduction of more legal handicaps.

The Severn Barrage

A REPORT is expected shortly from the expert sub-committee of the Severn Barrage Committee. The electrical interest of the barrage is the proposal to use the Severn tide to drive water-turbines generating electricity. We have seen various estimates of the capital cost of the civil engineering works, none of which encourages a hope of our being able to derive cheap electricity from this source, if the production of electricity is debited with the full charges. But if the scheme is required primarily for easy transport between the opposite coasts, then the generation of electricity as a by-product, with capital charges allocated for the electrical works only, should become a matter of moment to our industry.

Individual or Group Driving?

IT appears to be "the thing to do" in some quarters nowadays to condemn all but individual forms of machine electric driving. Is this quite correct? True, the electric motor is particularly suited to individual driving, and in most cases it certainly makes for a very neat job. Considerable savings in running costs have also been shown in many factories as the results of changing over to that form of drive. In some cases, however, especially where there are big load fluctuations, the advantage in running costs may lie with group methods. Modernisation of line shafting gives the question a different aspect. But nearly always the problem is one of capital *versus* running costs. To advocate rigidly one method of electric driving without consideration of all the other factors might easily prejudice a consumer against electric driving in any form.

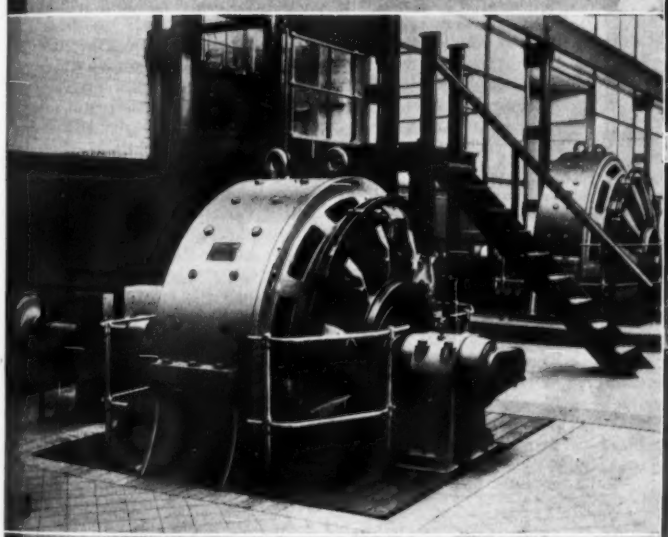
The Whitehead Rolling Mills

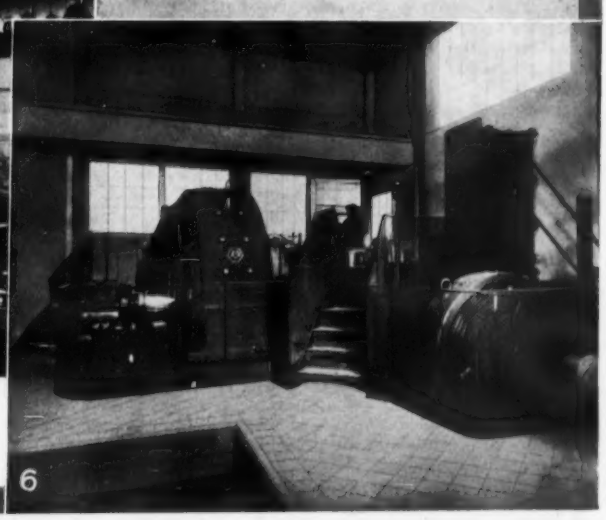
ONE of the several visits arranged for the Convention is of more than usual technical interest in providing an excellent example of a completely thought-out system of electric driving which has been adapted to the last detail to meet the requirements of the job. The Courtybella works of the Whitehead Iron & Steel Co., Ltd., described in an article appearing in this issue, is very busy; and this may cause some surprise to visitors who believe that South Wales is everywhere in a depressed condition. How far the activity at these mills may be due to an intelligent exploitation of electrification one can hardly say, but orders may be gained or lost on small margins in these days. The dual capacity in which Mr. H. G. Weaver, M.I.E.E., exercises his responsibilities as works manager and electrical engineer is, no doubt, an important factor.

Cooking at Cardiff

ALTHOUGH the exhibition of domestic electrical apparatus, which one had come to regard as a regular feature at the I.M.E.A. conventions, has been dispensed with this time owing to the shortening process, it should be noted that there will be several local cooking exhibits on view, including one at the Cardiff Corporation showroom and others at the local branches of manufacturers; further, the E.D.A. cooking campaign still in progress should "make itself felt."

1. The No. 3 Mill motor room and 700-h.p. finishing mill motors. 2. General view of the semi-continuous bar mill. 3. The 700-h.p. roughing mill and 1,500-h.p. finishing mill motors (No. 3 Mill)





4. The continuous hoop and tube-strip mill. 5. The control platform of No. 3 Mill. 6. The roughing and edging motors and control platform, from which the whole of the equipment is visible, in No. 2 Mill

The Whitehead Rolling Mills at Newport, Mon. (*see next page*).

Electric Rolling Mills

The Whitehead Steel Works at Newport (Mon.)

ENGINEERS taking part in the I.M.E.A. Convention may be recommended to visit the Courtybella Works of the Whitehead Iron & Steel Co., Ltd., next Friday. They will find there electric rolling mills which are not only thoroughly modern in the driving methods employed, but which are working to full capacity—an inspiriting sight these days. The duty of these mills is the re-rolling of 30 ft. steel billets, round or square, from ⅜ in. to 2¼ in., and flats from 1¼ in. to 6 in. The mills are connected by a common billet storage, which is served by a Royce overhead electric crane with a span of 70 ft.

Electricity is obtained from the Newport Corporation's 6-kV system. During the past year the energy taken has amounted to 7.7 million kWh with a maximum demand of 3,976 kW at 99 per cent. power factor. Similar figures of the British Mannesmann Tube Co., kindly supplied us by Mr. A. Nichols Moore, the borough electrical engineer, of 4.97 million kWh and 1,612 kW, provide an indication of the importance of the heavy industrial load, as these two consumers alone account for nearly 38 per cent. of the output of 33¼ million kWh (neglecting losses) from Newport East power station, but only 16¼ per cent. of the maximum demand on the system.

[*Burnicle.*

Mr. H. G. Weaver, M.I.E.E., works manager and electrical engineer to the Whitehead Iron and Steel Co., Ltd.

The supply to the Whitehead Co. is converted to 500-V d.c. in two sub-stations. For No. 2 Mill four six-phase 1,000-kW 750-r.p.m. self-synchronising three-wire rotary converters are installed with 1,100-kVA, 3/6-phase, oil-immersed, self-cooled transformers. The h.v. switchboard comprises ten cubicle-type panels, and the l.v. switchboard seven panels and a 12-panel contactor board.

No. 3 Mill is supplied from two similar 1,500-kW, 600-r.p.m. rotaries through 1,650-kVA transformers. One 600-A 6.6-kV cubicle is lined up with the gear for No. 2 Mill, and is connected to a three-panel board in the main motor room of No. 3 Mill. Two panels serve the rotaries, and the third a 400-kVA three-phase 6-kV delta-star transformer, which supplies simultaneously 75-kVA at 125-V and 325-kVA at 500-V. The d.c. panel has 22 panels for controlling the rotaries, mill-motors, &c. The drivers' platforms for Nos. 2 and 3 Mills, from which a full view of the operations can be obtained, have a very complete equipment of master controllers, shunt-field regulators, tachometers (worked from magnetos on the motor shafts), ammeters scaled in horse-power, and recording wattmeters, which provide valuable indications as to the care exercised by the driver and the furnace heater, and to any frictional losses or other trouble when the mill is running light.

The control arrangements for No. 3 Mill are particularly noteworthy. The motors are started by automatic contactors operated by controllers on the driver's desk. This desk is a six-panel, sheet-steel board fitted with a master controller worked by a crank handle and a field rheostat hand-wheel. Behind the driver is a six-panel field switchboard, comprising a three-pole, double-throw, quick-break field discharge switch and resistance, which enables any of the mill motors to be reversed in emergency; one pole of the switch is interlocked with the control circuit of the main contactors.

The controllers on the desk are of the six-notch, drum-type, reversing type. The starting resistances, which are mounted on steel framework above the motor panels, are of the unbreakable type and are designed to pass twice full-load current for two minutes with the controller in the third notch, and also to allow the mill motor to run at creeping speed against one-third full-load torque for two minutes on the first notch of the controller without dangerous heating.

Continuous Tube-strip Mill

The oldest mill, No. 2, was installed in 1922; it is of the continuous-process type, and combines the main features of the Acme mill of Chicago and the Morgan tube-strip mill, and was the first of its kind in the world. The billets, after being heated in an inclined producer-gas furnace to a temperature of 1,200 deg. C., are fed to a roughing mill, comprising seven stands of 12 in. horizontal rolls, and one stand of vertical edging rolls, driven by a graduated chain of bevel gears connected through double helical reduction gear to a 1,500-h.p., 175/400-r.p.m. d.c. shunt-wound motor.

The second section of the roughing mill consists of one stand of vertical edging rolls, which control the width of the finished strip; this is independently driven by a 100-h.p. 280/900-r.p.m. motor in order to maintain the loops in the strips which are necessary to prevent pull. The finishing mill is driven by a 2,500-h.p. 140/240-r.p.m motor by three superimposed three-ply leather belts, 45 in. wide, each of which drives two stands of 12 in. rolls.

When the strip leaves the finishing mills it can be either reeled at speeds up to 3,000 ft. per min. or delivered in straight-cut lengths. Each reel is driven by an independent motor designed to accelerate up to 1,500 r.p.m. in three seconds, during which period it takes up to five times full-load current. Straight strip, which is mainly used in the tube trade, is passed through a rotary shear, designed at the works, which cuts off any length required from 9 to 30 ft., and then travels by a 100 ft. belt-driven conveyor to the piling rolls where it is automatically made into bundles.

The consumption of No. 2 Mill, including all auxiliaries, ranges from 215 kWh per ton for 1 in. wide 20-gauge strip, with an output of 50 to 55 tons in eight hours, to 105 kWh per ton for 2½ in. wide, 16-gauge strip, with an output of 160 tons; the net yield for cold billets, after crediting value of scrap, scale and defectives is about 97 per cent.

The production efficiency of the mill (i.e., the ratio of the maximum possible weight to the actual weight rolled per shift) varies from 64.3 for 3⅝ in. wide by 0.110 in. thick to 81.12 per cent. for 1 in. wide by 0.036 in. thick material.

Auxiliary Mills

The cold rolling mills, consisting of sixteen 8 in.×8 in. rollers in four tandem lines, were put down to salvage any irregularly rolled material from No. 2 Mill, but it also serves as an adjunct to the hot-rolling process. One 80-h.p. motor with a two to one speed range drives two rolls.

The auxiliary bar mill, No. 1, installed in 1926, is served by the same furnace and roughing mill as No. 2, but the dividing shear between them is put out of commission, and the 30 ft. billet is rolled down in a continuous length. The section after passing through the seven roughing stands is diverted to the first press of the looping train, which consists of four stands of two-high rolls, whence it goes to the cooling bed after being cut by rotary shears into 230 ft. lengths.

The first two stands are driven by a 200-h.p. 150/175-r.p.m. motor and the other two by a 300-h.p. 250/625-r.p.m. motor; both have light series in addition to the shunt windings to secure stability. The live roller gear on each side of the cooling bed is driven by a 15-h.p. 720 r.p.m. high-torque squirrel-cage motor, switched directly on to the mains, and operated by cam-contactor drum controllers.

The consumption per ton, inclusive, varies from 40 kWh for 2 in.×¼ in. billets, with an output of 130 tons per eight hours, to 240 kWh for ½ in. rounds with an output of 35 tons.

The Semi-continuous Bar Mill

The most recent mill is the 12 to 14 in. semi-continuous bar mill, No. 3, which was installed last year. The producer-gas furnace has a capacity of 40 tons per hour but is otherwise similar to that for No. 2 Mill. The roughing mill consists of seven stands of continuous rolls in two groups; the first has three stands of 14 in. dia. by 31½ in. rolls driven by a 700-h.p. 150/450-r.p.m. motor, and the second has four stands of 13 in. dia. by 24 in. rolls driven by a 1,500-h.p. 250/625-r.p.m. motor with a light series in addition to the shunt winding.

The finishing mill comprises four looping trains of 12 in. by 24 in. rolls, each driven by a 700-h.p. reversible motor. After leaving the finishing rolls the bars (500 to 2,000 ft. long) are cut to the length of the cooling bed—250 ft.—by rotary shears driven by 15-h.p. motors. The auxiliary motors on the No. 3 Mill like those on No. 2 are generally three-phase, 500-V machines except where variable speed is required, when 500-V d.c. shunt-wound motors are used, as in the case of the main-mill drives. The crane motors are all d.c. machines with cam-operated controllers.

Our thanks are due to Mr. H. G. Weaver, works manager and electrical engineer to the Whitehead Iron & Steel Co., Ltd., for permission to visit the works and for assistance rendered in the preparation of this article. The whole of the electrical equipment in the mills and sub-stations was designed (in conjunction with the company's engineer) and supplied by the Metropolitan-Vickers Electrical Co., Ltd.

The Howrah Jute Mills. By R. H. Wilmot, M.Sc., A.M.I.E.E.

The conversion of one of the largest establishments in India

JUTE and jute manufactures have averaged one-quarter of the whole volume of merchandise exported from India over a very long period of years. Practically the whole of the jute manufacturing industry of India is concentrated in the mills on the banks of the river Hooghly, the earliest of them having been built about seventy-five years ago. Many mills driven by slow speed reciprocating steam engines are still running after forty or fifty years' service, but most of those constructed during recent years are electrically driven, whilst a large number of the older mills have now been re-equipped with electrical drive throughout.

Included among the latter class are the Howrah Jute Mills, a group of three mills comprising 1,940 looms with a common finishing department, which were constructed in 1874. In order to avoid loss of production during the change-over some of the old rope drives were retained for transmitting about one-quarter of the total horse-power. The entire change-over was effected without any interference with the ordinary working programme.

The benefits derived by the Howrah Mills Co. from electrification are striking. In the first place the clearance of ground due to demolition of old boiler houses, engine rooms, chimneys, &c., and the filling in of a settling tank, has set free sufficient space for the construction of another complete 700 loom mill. This is a factor of great importance as the mills are situated in a congested urban locality affording no facilities for extension. Other benefits consist in a notable reduction in working expenses and an improvement in production due to a marked diminution in the number of breakages of yarn during the spinning process.

Transformers and Sub-station Switchgear

Power is supplied to the mills from the Calcutta Electric Supply Corporation's 6-kV, 3-phase, 50-cycle mains. A transformer sub-station erected in a central position contains four 2,000-kVA, 6-kV/3.3-kV transformers of the oil-immersed self-cooled type with external cooling tubes, expansion vessels, chloride breathers, and dial type thermometers. The windings are connected delta-star, with the secondary neutral brought out for earthing, and have the usual tappings to deal with voltage variations.

A special earthing cubicle mounted close to the transformers contains interlocked isolating links so arranged that the neutral point of only one transformer can be earthed at any time. For supplying the 230-V d.c. fans and other auxiliaries and the mill lighting, a 300-kW motor generator set is installed in the sub-station; the 440-b.h.p. 6-kV driving motor is of the synchronous-induction type.

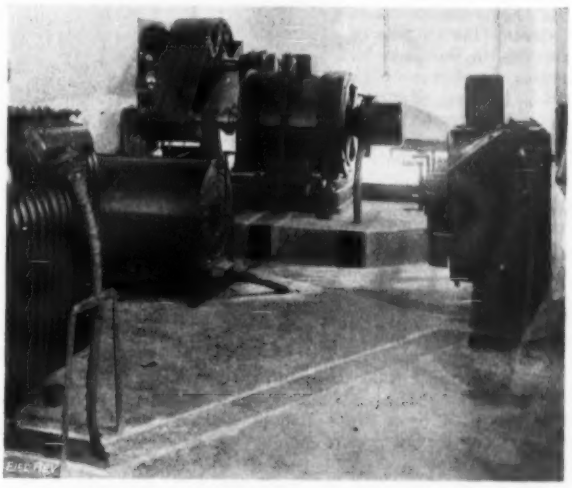
The switchgear installed in the sub-station by the Calcutta Electric Supply Corporation for the control of its incoming feeders is of the draw-out truck type and has a rupturing capacity of 250,000 kVA.

The main 6-kV distribution switchboard is of the sheet-steel cubicle type; it has eight panels, three controlling the incoming supply, four the 6-kV sides of the 2,000-kVA transformers, and one the 300-kW motor generator. Each panel is equipped with isolating switches, a 300-A automatic oil switch and instruments including ammeter and integrating kWh meter.

The main 3.3-kV distribution switchboard is also of the sheet-steel cubicle type; it has eleven panels, four controlling the secondary sides of the transformers and seven controlling feeders to the various sections of the mills. Each panel is equipped similarly to the 6.6-kV gear but the automatic oil switch has a capacity of 600 A.

Arrangement of Motors

There are twenty-six mill motors in all, with a total horse-power of 6,800. Mill No. 1 is operated by seventeen motors,



Slip-ring motor driving No. 1 Mill finishing department (chain case opened to show drive)

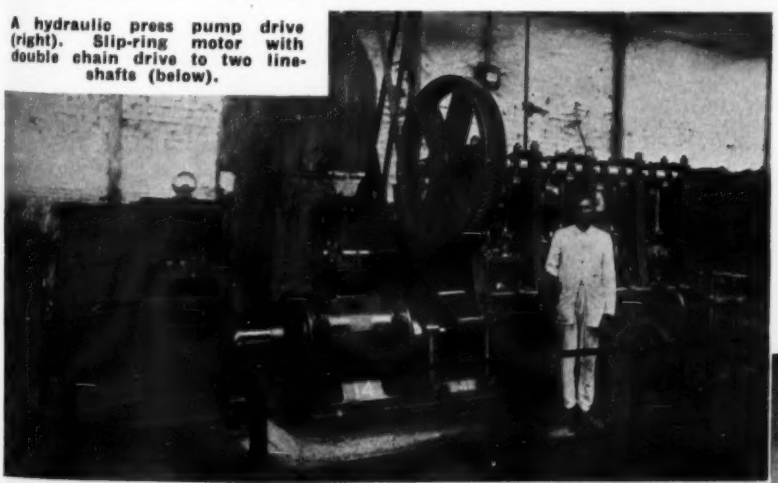
comprising two 550, two 330, and two 220-h.p. motors, driving lineshafts in the spinning departments, five 100-h.p. motors driving weaving shed lineshafts, a 220-h.p. motor driving the finishing department, one of 100 h.p. in the workshops, and four 50-h.p. motors driving eight barrel hydraulic press pumps.

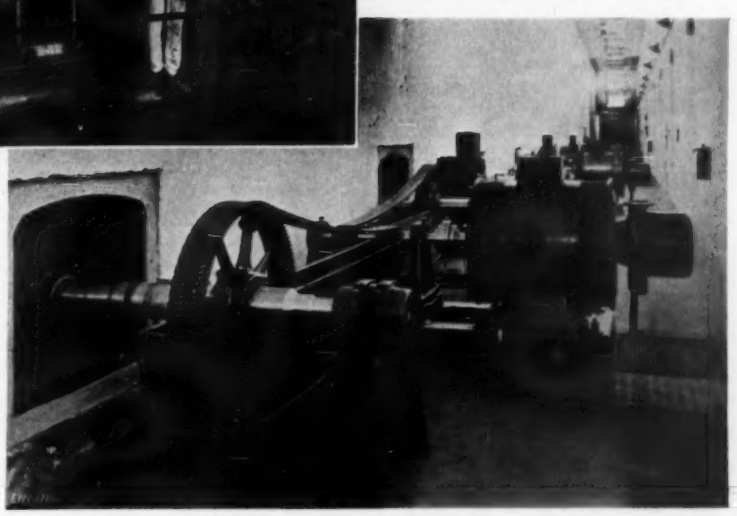
Mill No. 2 has three motors, 1,100-h.p. and 100-h.p. motors driving lineshafts in the spinning departments and a 330-h.p. motor driving the weaving section. Mill No. 3 is driven by six motors, 1,100-h.p. and 550-h.p. machines driving lineshafts in the spinning sections and four 100-h.p. motors the weaving-shed lineshafts.

All mill motors except four 50-h.p. machines (for which the 3.3-kV supply is transformed to 400 V by a local 200-kVA transformer) are wound for 6 kV. The 1,100, 550, and 330 h.p. motors are of the synchronous-induction type, the others are plain slip-ring machines. The synchronous-induction motors maintain unity power-factor on the 6-kV bus-bars at all loads.

The Calcutta Electric Supply Cor-

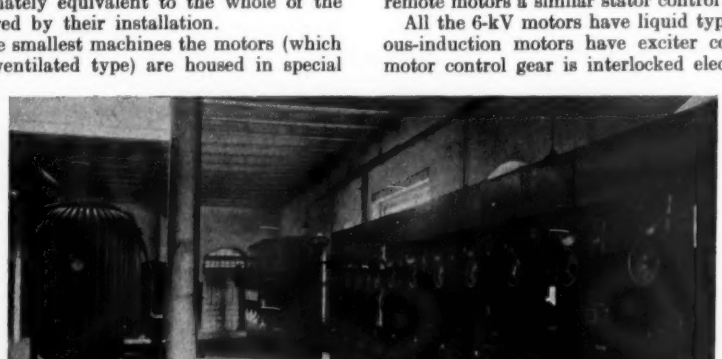
A hydraulic press pump drive (right). Slip-ring motor with double chain drive to two line-shafts (below).





poration allows a substantial rebate per kWh for power-factors exceeding 85 per cent. and exacts a penalty for power-factors below 80 per cent. The rebate earned by these synchronous-induction motors amounts to about £2,000 in one (normal) year, which is approximately equivalent to the whole of the extra capital cost incurred by their installation.

Except for a few of the smallest machines the motors (which are all of the enclosed-ventilated type) are housed in special motor houses outside the mill and so work in surroundings free from the dust and fluff with which the air inside a jute mill is always laden. In the hot climate of Calcutta (the air temperature in the motor houses sometimes exceeds 120 deg. F.) it is most important to ensure an unimpeded flow of air through the machine.



Main 6-kV and 3-kV distribution switchboards

Methods of Driving

The two 1,100-h.p. and the three 550-h.p. motors are direct-coupled to shafts running at 300 r.p.m. through Wellmann-Bibby flexible couplings. The three 330-h.p. motors run at 750 r.p.m. and the remainder at 735 r.p.m., the speed reduction in each case being effected by a Hans Renold silent inverted-tooth type chain. The driving chain pinions are keyed on to separate jackstaffs, which are supported by two pedestal-type roller bearings and coupled to the motor shafts by Wellmann-Bibby flexible couplings, each motor together with the two pedestal bearings being mounted on a bedplate.

The pedestal bearings on the motors of 330-h.p. and upwards employ a novel type of "controlled return-feed" oil-lubricated roller bearing, in which the oil circulation depends on the same principle as that used in oil-ring lubricated bearings, but the rollers act as a pump; this design has been found very reliable in service.

The weaving departments in No. 1 and No. 3 mills are driven by nine 100-h.p. motors installed in the old rope alleys outside the mills. Each motor drives a pair of lineshafts, one on each side, by means of Hans Renold chains. Continuous platforms of chequer plating carried on steel structures afford convenient access to the motors and drives.

The four 50-h.p. motors driving the hydraulic press-pumps through Renold chains, are automatically operated by contactors controlled by solenoids which start up the motors step by step. The equipment is controlled by a pair of push button switches placed close to the motor.

Press pump motors require to be started and stopped at very frequent intervals and it has been found by experience that the small extra cost of the automatically controlled gear is quickly repaid by the resulting improvement in production.

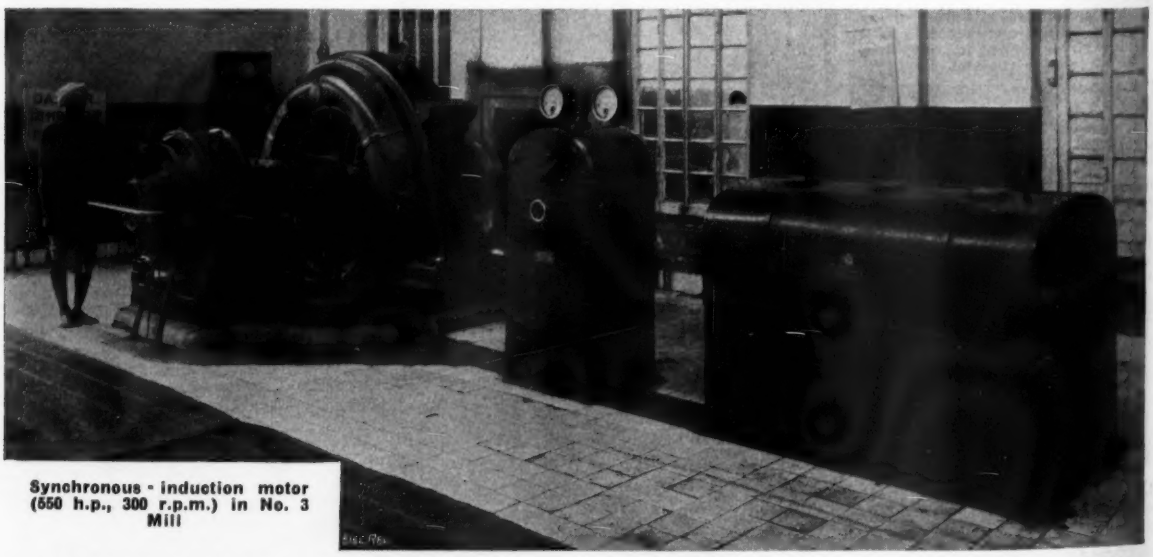
Each feeder cable serves an ironclad distribution board from which the circuits to the motors are taken. Each distribution pillar is equipped with an oil circuit breaker, isolating links, and ammeter. The circuit breaker serves as a stator control switch if the motor is near the distribution board, but for remote motors a similar stator control pillar is provided locally.

All the 6-kV motors have liquid type starters; the synchronous-induction motors have exciter control cubicles also. All motor control gear is interlocked electrically so that it is impossible to start the motor unless the liquid starter is in the off position and the brushes down.

The power cables throughout the mills (about 12,000 ft. in all) are of the three-core, paper-insulated, lead-covered, double steel-tape armoured type; they were supplied by Callender's Cable and Construction Co., Ltd.

The English Electric Co., Ltd., were main contractors for the whole of the sub-station and mill equipment and the complete installation was carried out by them.

The writer desires to thank Mr. J. A. Murray, manager of the Howrah Mills Co., who drew up the details of the electrification scheme, for his permission to obtain the description and photographs of the electrification of his mills.



Synchronous - induction motor (550 h.p., 300 r.p.m.) in No. 3 Mill

New Stabilising Device for Ships

THE possibility of stabilising large ships by means of a new type of "Thyratron" control equipment, utilising vacuum tubes and a small gyroscope, was recently demonstrated at Schenectady by Dr. E. F. W. Alexanderson, consulting engineer of the American General Electric Co., says a *Reuter's Trade Service* message from New York. The equipment utilises fins, designed like stream-line rudders, attached to opposite sides of a ship. The fins tilt up or down according to the roll of the ship, the movement of the fins being actuated by a small gyroscope, which relays its tiny impulses, greatly amplified by means of the "Thyratron" control, through wires to motors built inside the fins. Thus, if the ship were inclined to roll to one side, the fins would immediately be tilted down on one side and up on the other and *vice versa*.

Fins could be installed on the outside of existing ships without great expense. Estimates regarding the retarding effect on the ship of the resistance of the fin in the water indicate that the useful lateral force of the fin is thirty times as great as its resistance when in its neutral position. Calculated on this basis, it appears that a 23-knot ship of 50,000 h.p. would be delayed only forty minutes in a trans-Atlantic voyage, and a 30-knot ship with 180,000 h.p. only ten minutes. This is on the assumption that the voyage was undertaken in a smooth sea and the stabiliser not used. In a rough sea this loss of time would be compensated for by the stabiliser keeping the ship on an even keel.

Fifty Years of British Accumulator Making

IN the story of the early days of British electrical industry the year 1882 stands out conspicuously from the standpoint of practical achievement. The volumes of the ELECTRICAL REVIEW contain the record of a series of remarkable events which occurred within a couple of months in what was really a remarkable year.

In April the Chamberlain Electric Lighting Bill—a momentous measure—was introduced into Parliament. Upon its reference to a Select Committee of fifteen members, we described it as proof of the great progress that had been made in electric lighting.

Gaston Planté, inventor of the lead-acid storage battery

In April, too, Edison "incandescent lights," "two in each lamp with the gas kept burning between them," were lighting Holborn from Newgate Street to Holborn Circus, while Chesterfield was becoming for ever famous because it was "the first place of any considerable size in which the electric light . . entirely superseded gas in the streets." Also, in April, the Anglo-American Brush Electric Light Corporation Bill was read a second time in the Commons; the Hammond Company Electrical Engineering College was opened; and the Crystal Palace Electrical Exhibition was still in progress. The I.E.E. was then meeting under the title of the "Society of Telegraph Engineers and Electricians."

In May numerous electric lighting companies were registered—as many as five in one week—to operate at home, in Australasia, and in South Africa. Many appeals were made to the public and millions of pounds were subscribed. The REVIEW gave the warning of the baneful effects that would follow for the industry if the public were misled and lost their money through the "excessive cunning of unprincipled men."

In the same month the Swan United Electric Light Co. was registered with a capital of £1,000,000. Solicitors of the Edison and the Swan companies wrote to the daily Press regarding the charge that the Swan lamp was an infringement of Edison's patents, and the ELECTRICAL REVIEW asked: "Is this the beginning of a sham battle preparatory to a combination of the two companies?"

The Beginnings of the Storage Battery

It was in the atmosphere that these and other exciting events produced that an important movement took place in the secondary battery field, for in our issue of April 8th, 1882 (p. 251), we recorded that the directors of the Electrical Power Storage Company had entertained at dinner in the Crystal Palace a large number of gentlemen interested in electrical science and afterwards exhibited the capabilities of the new secondary battery of Messrs. Sellon & Volckmar, in its application to incandescent electric lighting, in the Alhambra Court. We added: "The battery more than confirmed the good impression it had already produced."

In the next week's REVIEW we stated that in consequence of the many conflicting rumours respecting the validity of the patents of the Sellon-Volckmar accumulator and the allegations made by M. Phillippart, the President of La Société Force et la Lumière, against M. Volckmar, it was not advisable "to enter into this matter at length just now as we had previously intended." In May followed the announcement that the directors of the Faure Electric Accumulator Co., Ltd., acting upon the opinion of their responsible electricians, had directed the solicitors of the company to commence legal proceedings against the Electrical Power Storage Co., Ltd., for infringing the patent of the Faure Co.

Now, taking a leap over fifty years, it is our duty and pleasure to report that the jubilee of the Electrical Power Storage Co., Ltd., has been celebrated this week at Dagenham and in London.

The history of the storage battery really started with the discovery of Planté in 1860 of the lead and peroxide of lead

The leaders of Pritchett & Gold & the E.P.S. Co., Ltd.:—1. Mr. G. R. N. Minchin, joint managing director. 2. Sir Archibald Gilbey Gold. 3. Mr. C. R. D. Pritchett, joint managing director and chairman of the National Accumulator Co. 4. Mr. K. Preston, chief chemist. 5. Mr. C. G. F. Pritchett, works manager. 6. Mr. William Peto, director.

battery, but it was not until 1880, when Camille A. Faure produced his accumulator, that the industry became commercially possible. Shortly afterwards new improvements were discovered by others, and on March 21st, 1882, the Electrical Power Storage Company was registered in this country to exploit the patents of Volckmar. Work on lead acid accumulators had been going on in France for some years previous to this, but the E.P.S. Co. was the first serious business undertaking of its kind.

The company commenced operations at Millwall, but within a couple of months the opposition of the owners of the Faure patents arose. A satisfactory arrangement was soon arrived at with the result that the E.P.S. Co. was granted permission to use the patents of both Volckmar and Faure. After that the company went ahead rapidly. In October, 1882, its output was 100 tons per week and 250 men were employed at the Millwall factory.

In the same year the company's batteries were installed by Messrs. Siemens in an Atlantic steamer, and the E.P.S. Co. converted a launch from steam to electrical working, putting in their accumulators and an electric motor; this launch was a feature of the "Varsity Boat Race" in 1883. Afterwards the "Immisch" launches, on the Thames, were all fitted with E.P.S. cells.

The making-up shop at the company's Dagenham Dock works

A Wide Scope

In the early days great hopes were held for accumulators, and very ambitious projects were almost at once attempted. Schemes were prepared for electric omnibuses, cabs and boats, all to be propelled by batteries made at the Millwall works. These propositions did not work out as well as was anticipated, but a large and increasing battery demand arose from other sources. With the development of electric lighting and tramway schemes all over the country the storage battery became an essential part of practically every power station, and many hundreds of E.P.S. batteries were installed in power stations at home and abroad. They were also requisitioned for lighting country houses, for train lighting, and for portable use, in fact, there were few electrical developments at that time which did not call for accumulators.

The E.P.S. Co. had the field to itself for some years, and a number of well-known electrical men gained their early experience there, including Sir Hugo Hirst, Bt., and the late Mr. Bernard Drake. Sir Oliver Lodge was for some years consulting engineer to the company.

In 1916 new facilities for modernisation and expansion which did not exist at Millwall were required, and the directors of the E.P.S. Co. amalgamated with Pritchetts and Gold, Ltd., who had been in existence since 1889. For some years the latter had their works at Feltham, Middlesex, but in 1913 the removal to Dagenham Dock in Essex took place; here they erected a modernly equipped factory. The old Millwall Works were closed down in 1917 and the new firm of Pritchett & Gold and the E.P.S. Co., Ltd., carried on the manufacture of accumulators at the Dagenham factory. After the War the company absorbed the business of Peto and Radford, with its large trade in accumulators for automobile starting, lighting and ignition.

To-day the company's products include stationary batteries for house lighting and for power stations; batteries for train lighting, launch and marine work, emergency lighting in cinemas, hospitals, and so forth; also portable "Dagenite" accumulators for motor car and radio service, which are marketed by the National Accumulator Company.

Major Sir Archibald Gilbey Gold, J.P., Deputy-Lieutenant of the County of Essex, is the chairman of Pritchett & Gold and E.P.S. Co., and the joint managing directors are Mr. C. R. D. Pritchett (who is also chairman of the National Accumulator Co., Ltd.) and Mr. G. R. N. Minchin. Mr. William Peto is a director and Mr. C. G. F. Pritchett, a son of the late Mr. G. E. B. Pritchett, who founded the firm of Pritchetts & Gold, is the works manager.

A Visit to the Works

The Dagenham Dock, Essex, factory, a tour of which took place on Tuesday, is well situated so far as power and transport facilities are concerned. The main supply of electricity is purchased from the County of London Electric Supply Co., and is converted to d.c. There are also a boiler house and engine room, the exhaust steam from the engine-driven generator being used for process work and factory heating. A 4,000-Ah battery carries peak loads.

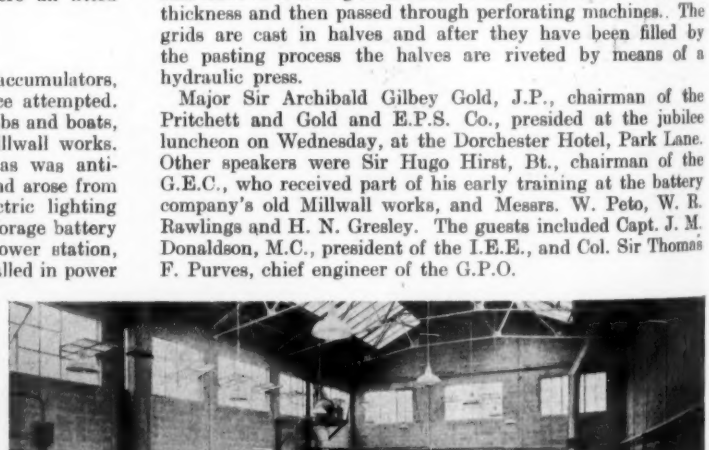
In the casting shop a particularly good system of protection against lead dust is in force and the baths, washing facilities, and care exercised to keep the workers' teeth clean and in good condition are noteworthy.

The bulk of the assembly operations is done by female labour, but whenever it is necessary to handle lead plates the work is carried out by men under efficient exhaust apparatus.

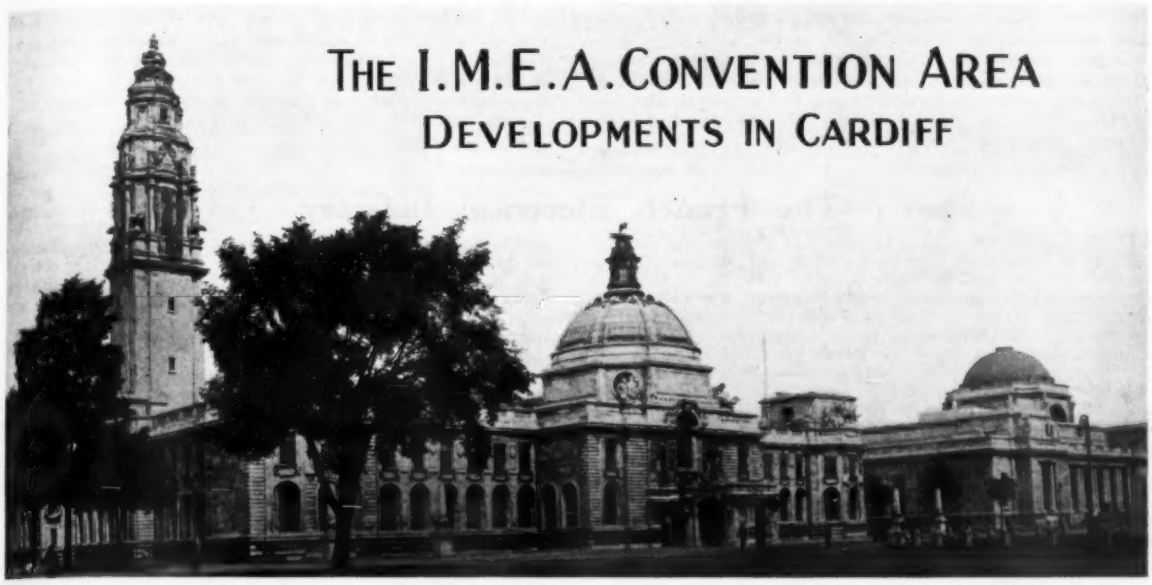
"Dagenite" is a special composition made only by this company for the moulding of container boxes and other components for railway train, omnibus, motor car, and radio accumulators. Gas-heated mixers and 150-ton presses are used, each finished box being electrically tested at high pressure.

Various lead burning operations, for which oxygen coal gas flames are used, require delicate skill; a scrap lead melting furnace saves money by reclamation, and all the sheet lead needed for the manufacture of linings of battery boxes and the perforated sheets which form part of the box negative plates are produced from 1-cwt. cast slabs in a rolling mill. Sheets are first rolled to 0.5 m.m. thickness and then passed through perforating machines. The grids are cast in halves and after they have been filled by the pasting process the halves are riveted by means of a hydraulic press.

Major Sir Archibald Gilbey Gold, J.P., chairman of the Pritchett and Gold and E.P.S. Co., presided at the jubilee luncheon on Wednesday, at the Dorchester Hotel, Park Lane. Other speakers were Sir Hugo Hirst, Bt., chairman of the G.E.C., who received part of his early training at the battery company's old Millwall works, and Messrs. W. Peto, W. R. Rawlings and H. N. Gresley. The guests included Capt. J. M. Donaldson, M.C., president of the I.E.E., and Col. Sir Thomas F. Purves, chief engineer of the G.P.O.



The plate-casting and trimming shop



THE I.M.E.A. CONVENTION AREA

DEVELOPMENTS IN CARDIFF

AS a result of a recent visit to Cardiff, the scene of next week's Convention of the Incorporated Municipal Electrical Association, we formed the distinct opinion that the town has suffered from its reputation as the coal capital of the world. Cardiff is indeed the natural outlet for a great coal-mining hinterland, but it is actually about seven miles from the nearest coal-bearing strata, and, it is claimed, its records of sunshine and ultra-violet radiation are equalled by only a few of the southern health resorts.

Those who reach the city from the west will find at the crossing of the River Taff the magnificent Cathays Park, with its public buildings—fine examples of modern adaptation of Renaissance architecture. In one of these buildings, the City Hall, the Convention papers will be read and the various functions held. Near by is Cardiff Castle (the residence of the Marquis of Bute), which lies opposite the Angel Hotel, the I.M.E.A. Council's headquarters. Cardiff possesses also 38 parks and open spaces, while within easy distance are many spots of historic and scenic interest.

Coal stands easily first among the local industries, and the proportion exported of the total won in 1930 was over 50 per cent., compared with 23 per cent. for the whole of the country. The Bute Docks with an area of 165 acres and a quay frontage of 37,630 ft. were designed to deal adequately with this and the many other trades for which Cardiff is noted, the most important of which are iron and steel and grain milling.

An Electrical Undertaking

Public supply was given in Cardiff by the Brush Co. as long ago as 1884. The Corporation began to operate in 1894 with a 360-kW single-phase, 2,500-V, 40-cycle power station, with a distribution system of v.i.r. cables drawn into c.i. pipes.

The present three-phase, 6.6-kV, 50-cycle station at Roath (which will be visited by the I.M.E.A. delegates on Saturday of next week) was started up in 1904. The present capacity is 31,000 kW, made up of one 10,000-, three 5,000-, and three 2,000-kW turbo-alternators and six 23,000-lb. and eight 40,000-lb. w.t. boilers. The maximum load last winter was 20,800 kW.

The station has been selected for operation by the Central Electricity Board under the S.W. England and S. Wales Regional Scheme, and a grid sub-station is now under construction on an adjoining site. The rupturing capacity of the main switchgear in the station is to be increased in due course from 350,000 kVA to 500,000 kVA.

A Progressive Policy

Distributors are laid in practically every street and the mileage of mains is 450. The city electrical engineer, Mr. C. G. Morley New, who is this year's president of the I.M.E.A., told us that his policy was to obtain as many consumers as possible, no matter how small their requirements, in the belief that a full use will subsequently be made of the supply—a belief that has been fully justified in the event, as the consumption is over 200 kWh per head. Power consumers who required supplies initially for only part of their works have discovered the advantages of taking an ever-increasing amount from the public mains. As an example, Mr. Morley New referred to the arrangements made for supplying ten million kWh at 59 per cent. load factor to Messrs. Spillers & Bakers' new silo and provender mill on the quayside, where a large part of their milling operations will be concentrated; this firm originally required the Corporation supply only for week-ends, but experience was decisive in favour of its sole adoption for the new plant.

The number of consumers has increased by 3½ times during the past seven years to 38,800, with about 100,000 kW of connected land; included in this are nearly 4,000 motors with an aggregate h.p. exceeding 35,000, as there are now very few power users, from ice-making to steel-smelting, whose works are not supplied from the Corporation mains. As the population of Cardiff is only 230,000, and the number of dwelling-houses but 48,700, to have obtained nearly 40,000 consumers is a remarkable achievement.

Lighting and Domestic Consumers

There has been steady progress in the domestic field since 1925, when the Department began to hire out cookers, 1,360 of which are now connected. In 1927 an assisted wiring scheme was introduced, the installation work being carried out through local contractors. For five- six-, and seven-light

A view of central Cardiff from the air

installations, 6¾d. per kWh is charged, or 2¾d. above the ordinary slot-meter rate, until 700, 800, or 900 kWh have been consumed, respectively, and two lamps per annum are given. These schemes (which are financed from revenue) brought in over 12,000 consumers in three years, and by March 31st last 12,471 installations had been provided on the slot-meter scheme. Showrooms were opened in 1928.

The residential tariff is 10 per cent. of the rateable value plus ¾d. per kWh in winter and ¼d. in summer. This is an alternative to a lighting flat rate of 3¼d. and 1d. for heating in the winter and ¼d. all the year if a cooker is used. Late shop-window lighting is charged at half the ordinary rate, and the maximum rate charged by the undertaking for power is 1 1/16d. per kWh.

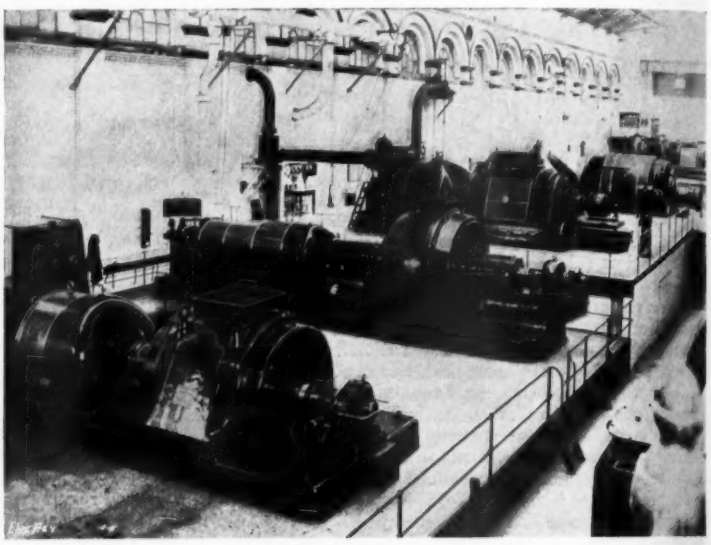
The French Electrical Industry

THE report of the managing council of the Syndicat Général de la Production Electrique, which was submitted at the annual meeting held in Paris on May 12th, states that the movement in the depression became accelerated in the second quarter in 1931, and all branches of manufacture are experiencing a material slackening at the present time.

In the case of heavy electrical machinery the orders booked last year showed a decrease of 45 per cent. as compared with 1930 and one of 55 per cent. as against 1929. Last year the decrease amounted to 29 per cent. in the case of heavy apparatus, 38 per cent. for turbines, 37 per cent. for transformers, and 55 per cent. for large machines. During the first three months of 1932 the state of depression has become accentuated and the orders received in this period represent a further reduction of about 45 per cent., as compared with the quarterly average in 1931.

The market for plant of small and medium sizes for a long time maintained a relative resistance, but in its turn it has been seriously hit in recent months. During 1931 the various branches experienced a decline of about 25 per cent. over the previous year, but the first quarter of the current year has shown further reductions as compared with the last quarter in 1931, *viz.*, 15 per cent. in small apparatus and 28 per cent. in the case of machines and transformers.

Generally speaking, the degree of activity in all branches of electrical construction at the present time has been reduced by 45 per cent., as compared with that in 1930. In the final months of last year the number of workpeople employed was 25 per cent. less than in the corresponding period of the previous year; there was an increase in short time shifts and in general the working week was less than forty hours; and now the course of orders that are being booked will call for a further reduction in the number employed.



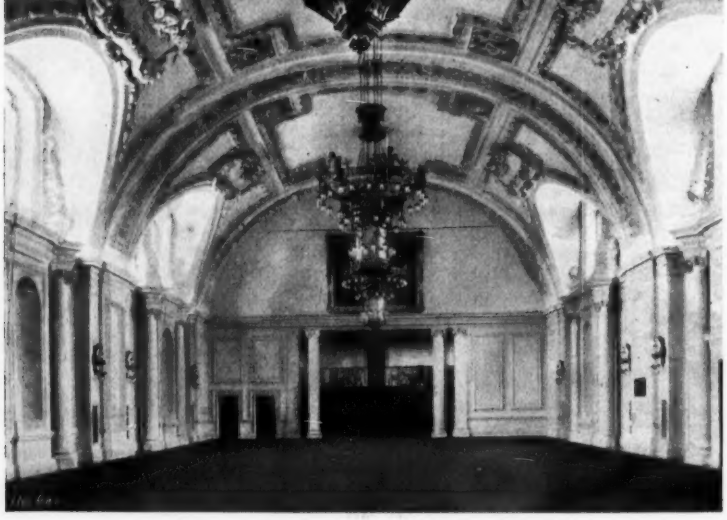
The turbine room of Roath power station, Cardiff

High Import Level

In face of such depression and the absence of any indication of an early revival, the pre-occupation of the Syndicat has caused it to turn to the safeguarding of the market. Imports have not followed in the same degree the downward trend in the French home market, but have been maintained on a high level.

Apart from reparation deliveries the imports in 1931 amounted to 1,005 tons of the value of 566 millions of francs, as compared with 1,075 tons and 616 million francs in 1930. As compared with 1927 the imports last year increased by 183 per cent. in tonnage and 142 per cent. in value. The French imports from Germany further increased last year, whereas the total exports of electrical products from Germany decreased by 10 per cent. in 1931.

In these circumstances the report states that the situation called for the adoption of immediate measures on the part of France. An increase in the import duties would have incurred the risk of being ineffective and would have lacked flexibility. The question being one of re-establishing equilibrium in a market which was disorganised by offers of machinery and plant in bulk, it was concluded that only by directly regulating foreign imports would it be possible to attain the object in view. This was the aim of the agreement entered into by the Syndicat and the German electrical industry in January last, which has since been completed by private conventions, so that the quota agreement now covers about 80 per cent. of the market.



The Assembly Room at the Cardiff City Hall

Outlook for the Future

After having discussed the position of the French industry in export markets and the monetary difficulties which impede the exports, the report deals with the question of a revival of activity. It is submitted that the French industry is not over-equipped for production under normal circumstances, but is now suffering from under-consumption, against which an effort of collective reaction is necessary.

In this connection the Syndicat points out that it is chiefly the State and the administrative departments which ought to play a determining part. It was, for instance, suggested before the war by a special Government committee that the public administrations should apply themselves to pressing forward the course of their orders during periods of depression, and in slackening them in periods of prosperity. The electrical industry would appreciate the application of these opinions as being very opportune. The revival of the electrification programmes would stimulate the activity of various works, and a scheme has already been foreshadowed for the electrification of country districts in the equipment plan of December 28th, 1931.

On the other hand, the work of converting a further length of 3,000 km. of line has been included in the railway programme, as adopted last December, but which has not yet received definite approval. In the circumstances it is suggested that these schemes should be accelerated in order to provide further work for the electrical industry.

In conclusion, the report mentions an extension of the export trade to the French colonial possessions. These exports only reached a value of 212 million francs last year, or two-fifths of the French total exports, but it is considered that these markets will develop considerably.

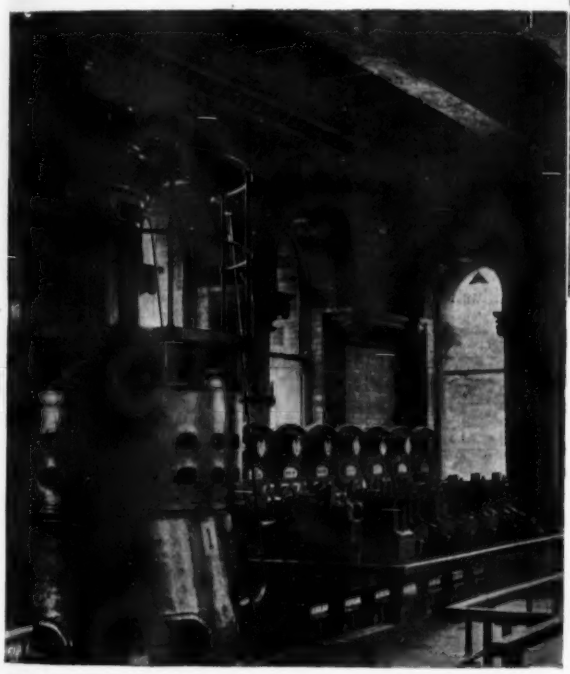
A Large Pumping Station

A steam to electric conversion

ONE of the most interesting steam to electric drive conversion schemes that we have seen is that at the L.C.C. Abbey Mills sewage pumping station, where it was projected to replace the eight 180/200-h.p. beam-engine driven pumps by modern electric motor pumps. The scheme was designed to be carried out in two stages, the first of which was recently completed.

The building plan is cross shape with four bays, and a temporary partition diagonally across the centre separates the west and north from the south and east bays. In each of the two former bays there are now working two 600-h.p. motor pumps, while in the other section of the station demolition of the old steam equipment is nearing completion. The main equipment in each of the four bays will be identical, except that the main switchgear, remote-control board, and auxiliary-equipment switchboard for the whole station are in the east bay, and the main motor switchgear for the whole installation is in the south bay.

Supply is received at 6,250 V, two-phase, from the West Ham electricity undertaking by two feeders terminating in 1,200-A oil switches operated by a bus-bar coupler of the same size. Seven 400-A switches, four on one flank and three



The 2,200-V (3-phase) switchgear and motor in the south bay

on the other, are in line with the incoming breakers, and they govern four main transformer banks and two auxiliary transformers, with one spare unit.

Remote Control Employed

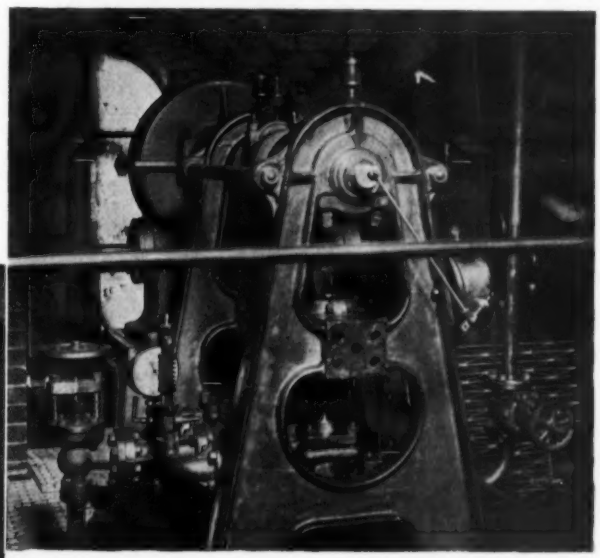
All the switches except the bus couplers are normally remote controlled, but they can be hand operated if necessary. The two incoming feeder switches and those for the auxiliary transformers have push-buttons for hand operation in case of failure of the remote control supply. Pressure on the push-button energises the no-volt coil, permitting the switch to be hand operated exactly as happens under remote control working. The breakers are all of the oil-filled, heavy metal-clad, horizontal-isolation type, with a common bus-bar chamber, and were supplied by Metropolitan Vickers Electrical Co., Ltd.

There are two 1,000-kVA s.p. units in each main transformer bank, Scott-connected and thereby giving a 2,200-V, three-phase supply to one of the four transformer breakers on the main motor switchgear in the south bay. The two 100-kVA auxiliary transformers are separate two- to three-phase units, each affording a 400-V supply to the auxiliary distribution-board bus-bars. The transformers are situated outside the building, and are of the oil-circulation, air-cooled type supplied by Crompton Parkinson, Ltd.

Each bank of 2,200-V, three-phase switchgear has two 800-A transformer breakers and four 400-A motor units, and a spare (spare transformer unit on one bank and spare motor switch on the other line). The banks are on either side of the bay, and one is flanked by a bus-bar coupler. The interconnection is underground. These switches are similar in type and of the same make as the main 6,250-V equipment. The transformer units are governed from the remote-control board and each motor breaker from its corresponding motor control panel.

The Auxiliary Switchgear

The auxiliary switchboard is a simple and neat seven-panel flat-back equipment, with two incoming feeder panels from the smaller transformers (400 V) on the flanks and five distribution panels. Four of the latter panels are equipped with both three-phase and single-phase (phase to neutral) switches. This board is also of M.V. manufacture. The remote control equipment is operated at 230 V.



Electrically driven hydraulic pump for sluice-valve operation

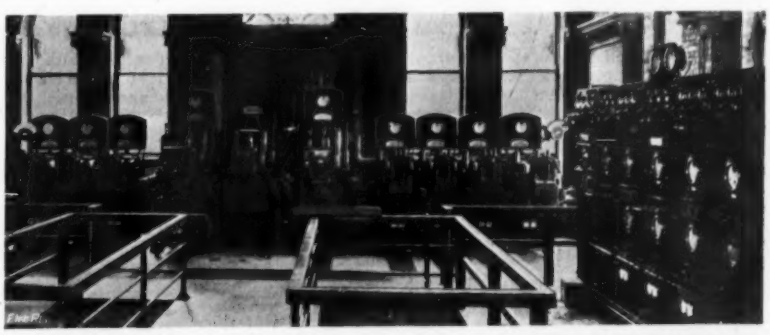
On the M.V. remote-control board, about 12 ft. square, there are twelve operating switches, eight for the 6,250-V equipment (not the coupler) and four for the 2,200-V transformer switches. The 6,250-, 2,200- and 400-V circuits are all depicted by diagrams in different colours on this board, with automatic semaphore indicators and lamps for the h.v. switches. Ammeters in each circuit duplicate those on all the h.v. switches. Two Cambridge distant-thermometer indicators for the transformers have a six-way switch each, five-way in use.

The main motors were made by Crompton Parkinson, Ltd., and they are auto-synchronous vertical equipments, 600 h.p., 2,200 V, 214 r.p.m., with exciters carried on the end of the shaft. Each motor is served by its own control panel equipped with a p.f. meter; an ammeter, voltmeter and rheostat in the field circuit; a remote-control switch for the 2,200-V breaker; an integrating kWh meter; and a recording kW meter.

Quick Starting

Each pump will deal normally with 125 tons of sewage per minute, and we saw one started up and put on load in less than 1¼ minutes, including operating the hydraulically controlled sluice valves. In the sub-basement a 20-h.p. motor drives a hydraulic pump feeding an accumulator for valve operation. It is automatically controlled by C.P. contactor gear with solenoid-operated contactors connected to tapping switches on the accumulator.

A ring main round the four bays in the basement is equipped with plug points from each of which a portable 15-h.p. motor-pump for surface drainage work can be supplied.



The main switchgear (6,250-V, 2-phase) board and distribution switchboard

Three-core 66-kV Cable

A new product which can be coiled on drums of reasonable size

THE practice in this country has hitherto been to make all 66-kV underground power cable of the single-core type, because the dimensions of three-core cable having the dielectric thickness thought necessary for this voltage would exceed the permissible limits of safe and economical transport and installation.

Such great thickness of insulation has been deemed necessary because of the desire to retain the maximum dielectric stress at the value which is customary when lower voltages are concerned. There is, however, a substantial body of opinion which maintains that, in view of the known difficulty of thoroughly drying and impregnating a very great thickness of paper, a moderate thickness very thoroughly impregnated provides the more satisfactory insulation, notwithstanding the higher potential gradients to which it is exposed. Thinner dielectric walls have the added advantage that they present lower resistance to the passage of heat generated in the conductors.

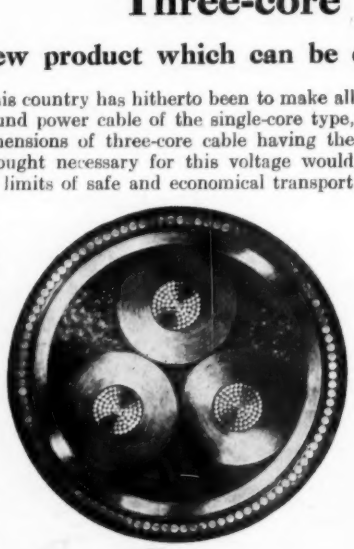


Fig. 1

Overheating Without Injury

Having in view the above considerations, together with the admitted advantages of three-core cables over groups of single cables, Messrs. Siemens Bros. & Co., Ltd., have thoroughly investigated the possibilities of three-core radial stress cables for 66-kV working pressure. Both the S.L. and "H" types have been subjected to exhaustive loading cycle and other tests, with the result that the "H" pattern has been selected as by far the more satisfactory solution from the point of view of being able to sustain repeated overheating without injury.

The design adopted is illustrated in cross section in fig. 1. The radial thickness of dielectric is 0.5 in. and the minimum diameter of conductor is 0.72 in., or that of 0.3 sq. in. standard copper strand. In the event of this section of copper exceeding requirements, the necessary diameter will be attained by the insertion of yarn dummies in the centre of the strand. The resulting maximum stress at working pressure is 4.7 kV per mm. In order to provide a smooth outer surface to the conductor, it is screened by means of a layer of semi-conducting paper, which is applied immediately before the insulating paper.

In other respects the cable is made up on lines exactly similar to the now well-known "H" type of cable which is giving such satisfactory service at 33 kV. The overall diameter is 5 in. and the weight per yard approximately 85 lb.; lengths of 200 yds. can be packed on drums of readily manageable dimensions. Fig. 2 shows the cable on a drum.

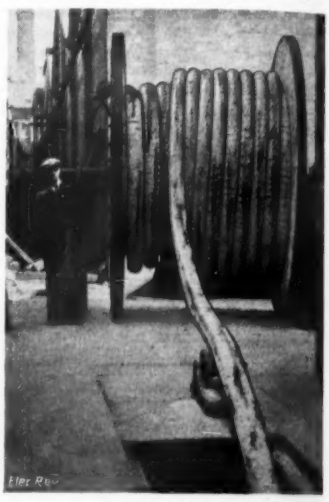


Fig. 2

Performance on Test

At the manufacturer's works a commercial length of the cable illustrated has been subjected to prolonged loading cycle tests during which, after many runs to 50 deg. C., conductor temperatures exceeding 70 deg. C. were attained ten times, followed by over 80 deg. C. on twelve occasions. Finally, temperatures exceeding 100 deg. C. were attained on several occasions, being twice sufficiently prolonged to bring about thermal breakdown at working voltage.

The curves in fig. 3 indicate the stability of the cable, the power factor/voltage relationship not having been affected by prolonged and severe overheating. Graph A was obtained at 21 deg. C. before the commencement of the heating cycles; graph B gives values obtained at 73 deg. C., while graph C gives the results at 18 deg. C., after the conclusion of the runs at 80 deg. C.; graph D shows results obtained on the remnant of the sample when cool after two thermal breakdowns at well over 100 deg. C.

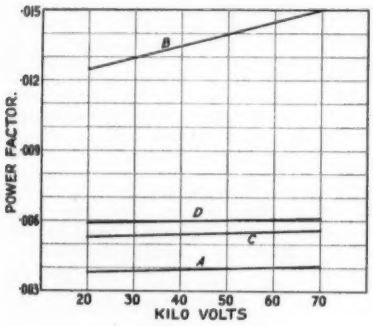


Fig. 3

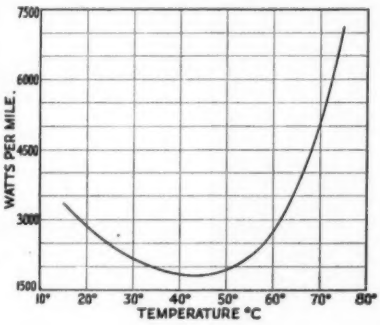


Fig. 4

The three-phase dielectric loss at working pressure and at various temperatures is indicated in watts per mile of this cable in fig. 4.

The Adhesion of Electro-deposited Nickel

IN a paper read before the Electroplaters' and Depositors' Technical Society, Mr. A. W. Hothersall describes investigations carried out in the Research Department at Woolwich Arsenal, with funds provided by the British Non-Ferrous Metals Research Association, with the object of determining the more important causes of poor adhesion of nickel electro-deposited on brass for decorative purposes, and of attempting to evolve methods of treating polished brass surfaces so as to secure a high degree of adhesion without destroying the finish.

Whilst relatively good adhesion was obtained to filed or machined brass, only a slight degree (such that the deposit could be pulled off with the fingers) was obtained in the case of emeried brass. The results from the tests applied do not, however, indicate the true adhesion as the test pieces invariably failed in the surface layers of the brass and not at the deposit/brass interface. In the majority of cases, heat treatment of the nickel-coated specimens at 250 deg. C. for two hours improved very considerably the degree of adhesion of nickel deposits to surfaces not subjected to etching during cleaning, and a similar improvement was generally obtained by the preliminary deposition of a layer of copper from the acid sulphate solution followed by deposition of nickel.

By these methods fairly strongly adherent deposits could be formed on emeried brass, and with their use the effect of progressive etching of an emeried surface was studied. The degree of adhesion increased gradually with the degree of etching, and it is concluded that the poor adhesion of electro-deposited nickel which is obtained on unetched emeried brass is due partly to embrittlement of the surface layers by adsorption of hydrogen and partly to the inherently weak condition produced by the emery treatment.

In the case of buffed brass, the material which is particularly weak inherently, and is principally susceptible to hydrogen embrittlement, is confined to an extremely thin surface skin, probably less than 0.0005 mm. in thickness. The removal of this skin by means of suitable etching treatment before deposition of nickel results in the production of adherent deposits. Etching by means of nitric acid or mixtures containing nitric acid is undesirable, as the process cannot be satisfactorily controlled. Anodic etching in a suitable solution, however, affords a means whereby polished brass surfaces may be sufficiently etched to ensure the production of adherent nickel deposits without noticeably dimming the lustre.

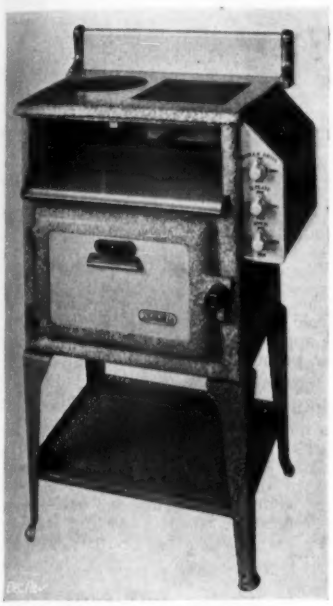
Two solutions have been used for the anodic etching of brass—a potassium cyanide solution, and a solution containing citric acid and ammonium citrate. Treatment of buffed brass at 10 A per sq. ft. for about half a minute is sufficient to ensure the production of highly adherent nickel deposits on a number of different types of brass without appreciably affecting the polished appearance.

Recent Cooker Developments

New small and large models

PROBABLY because of the opportunities presented by the exhibitions held in connection with the I.M.E.A. conventions during the past few years, it seems to have become a practice generally for manufacturers of domestic apparatus to introduce new models about this time of the year, and it is interesting to learn that at least a few companies are now introducing new cookers, &c., although there is to be no official exhibition at the Convention this month.

Messrs. Belling & Co., for instance, have introduced four new cookers, two vertical models with a horizontal cooker corresponding to each, which extends their existing cooker range both ways. The new 33B model is now the smallest of the vertical cookers, excluding the "Baby" 32A, which is not considered by the company as one of the normal cooker range. It has been developed mainly from initial price considerations, but the oven space has been kept exactly the same as in the larger model, No. 33A, which allows a clear cooking space 12 in. wide, 11¾ in. high and 11¼ in. deep. The loading is little more than that of the "Baby," which has a common top oven element and boiler-griller.

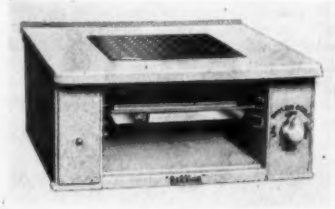


The new "Xcel" model

Except that the new model has only a boiler-griller hob unit, as compared with a boiler-griller and a separate plate on the next larger model, the loadings are the same —oven, top and bottom elements 850 W each, and 2,250 W for the hob unit. But the overall dimensions have been reduced from 22 in. wide, 42 in. high and 18 in. deep, to 17 in. by 41 in. by 16 in.

The construction of the optional semi-open boiler-griller has been modified a little. The holes have been splayed open at the bottom, so as to draw any spilt liquids clear of the element. Both the semi-open and closed types are to be available for some time, presumably for the public's decision as to which is better. A reflector plate is fitted under the boiler-griller when it is used for boiling only.

As with all other models in the range, a six-pint square-bottom non-electric kettle, to fit the boiler-griller, is now supplied as part of the equipment. This is not of the special thick and machined-bottom type, and it is interesting to learn that Messrs. Belling do not consider it policy to advocate such utensils for, at an rate, the smaller consumers. The kettle is well made, however, and it is claimed that it will fulfil all practical requirements.



A new breakfast cooker

The switches have been removed from the side to underneath the hob and the fuses are situated under the hob at the back.

A new table or breakfast cooker is made to the same specification as the top of model 33B, but there is only one three-heat switch for the boiler-griller, which gives it a slightly different appearance, because of the absence of oven switches on one side.

It is a little unusual nowadays to see manufacturers extending their cooker ranges at the larger end. Since opening their new showrooms in Regent Street the company has apparently found a demand for cookers in the larger houses where two meals may have to be cooked simultaneously. The design of the new model 36A is on similar lines to that of the smaller 35A, which has a boiler-griller and two boiling plates; but in the new model there is the same 2,250-W boiler-griller, 8¼ in. square, also two circular boiling plates and a square one. The two circular plates remain the same as in the smaller model, having diameters of 6¼ and 7¼ in., and loadings of 1,100 W and 1,200 W, respectively, but an additional plate 8 in. square with a loading of 2,250 W is provided (a 7¼-in. diameter 1,200-W plate is optional in place of a square one).

The oven is appreciably larger than model 35A, measuring 16 in. by 18 in. by 16 in.; both the top and bottom elements are loaded at 2,000 W, and are, as in all the other models, of an easily removable plug-in "pan" type. The overall width is 28 in., the height 43¾ in., and the depth 26 in.

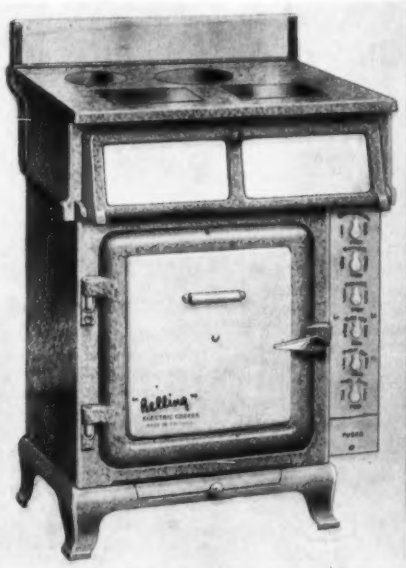
A New "Xcel" Model

The outstanding feature of a newcomer to the range of Siemens "Xcel" cookers, namely, model H41542, is that the elements are fitted with four-pin plug-in connections, giving a reliable earth connection, and slide easily between guides into corresponding contacts. The pins and contact sockets are made of dissimilar metals in order to minimise the possibility of seizure and corrosion. There is a closed boiling plate rated at 1,200 W, 7 in. in diameter, and the rectangular boiler-griller has a rating of 1,500 W. The oven measures 12 in. x 13 in. x 10 in., and is heated by an easily removable 1,400-W closed element.

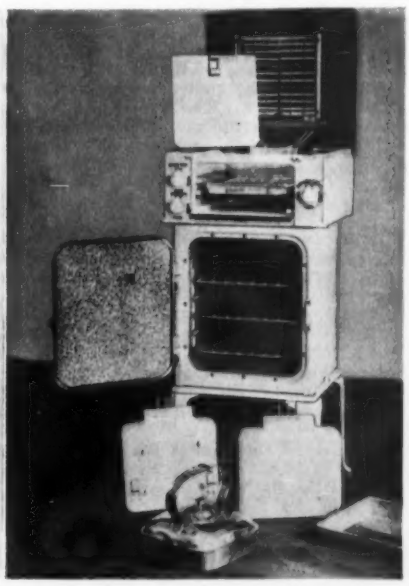
Three-heat switching is provided throughout, and each control embodies an individual fuse for its element. A warming chamber is provided under the hob, and the oven is finished in mottled vitreous enamel. A thermometer is incorporated in the oven door, and the oven itself is heavily lagged with the corners rounded to simplify cleaning. Removable shelf hangers are fitted in nickel finish and free from distortion, while all wiring is completely protected from drip. Incidentally, the boiling plates originally introduced for use with "Xcel" cookers can now be obtained for almost any type of cooker.

"Unit" Construction

Considerable developments have recently taken place in the range of large cookers made by the Allgemeine Elektricitäts-Gesellschaft in conjunction with Messrs. F. Küppersbusch und Söhne A.-G. Instead of manufacturing large cookers as single units, production was simplified by assembling each range out of separate sections, each in the form of an independent unit made in three depths, 35½ in., 43 in., and 51 in.



The largest of the Belling range



The new 33B Belling

The top plate of each section is fitted with four boiling plates regulated independently of each other; several sizes are available, and all are provided with three-heat control. The oven is arranged on the "Carnifix" system; the elements, comprising a row of heating rods, are of the closed type and are placed at the top and bottom of the oven—six rods at the top and six at the bottom. The ovens of the large cooking ranges have an internal height of 11 in., the depth is 35½ in., and the width varies, according to the size of the range, from 17¾ in. to 23½ in. The loading is from 4 kW to 6 kW.

Measuring Instruments

Recent Crompton Parkinson Developments

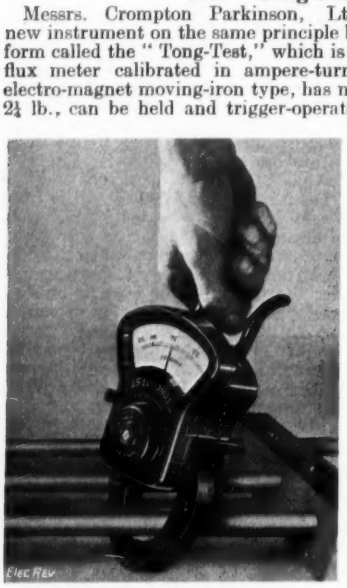
THE multiplication of small distribution sub-stations has brought to the fore the question of the use of current-indicating instruments. The cost of providing these for every circuit may be prohibitive, and readings are then usually restricted to occasions when relatively elaborate tests can be made.

It is often impermissible to break the circuit to insert an ammeter, and a.c. instruments requiring no electrical connection with the circuit were formerly limited to those operated from a split-type current transformer, which involves the use of hot-wire or moving-iron instruments.

The introduction of the Crompton "A.C. Test" (an instrument on the moving-iron principle which enabled either current or potential values to be determined without the use of separate c.t.s. or shunts) eliminated the need for a c.t. operated indicator. Although this instrument was portable its size and arrangement made its use difficult in some cases.

The "Tong-Test"

Messrs. Crompton Parkinson, Ltd., have shown us a new instrument on the same principle but of a more convenient form called the "Tong-Test," which is essentially an indicating flux meter calibrated in ampere-turns. It is of the split electro-magnet moving-iron type, has no windings, weighs only 2¼ lb., can be held and trigger-operated by one hand, and is applicable to a.c. or d.c. cables up to 1⅛ in. in diameter. D.c. readings can be taken even if the cable is of the single-core armoured type or is run in steel conduit, and the range can be altered by changing the detachable movement unit.



The "Tong-Test"

As the magnetic reluctance of the butt joint is low compared with that of the movement gap, small variations due to dirt, &c., have a negligible effect on accuracy. The magnetic circuit consists of two equal packs of iron stampings, one rigidly fixed and the other hinged to a die-cast aluminium-alloy frame. They are mounted to form an iron ring with two gaps, one a well machined butt joint and the other a specially shaped gap in which the movement operates in sapphire bearings.

The movement is contained in a bakelite housing, and the units are manufactured in four maximum readings, *viz.*, 50, 100, 150 and 200 A. The scale of the instrument is 2⅛ in. long. On a.c. systems the accuracy is within the limits of error specified in British Standard Specification No. 89/1929, for first-grade instruments; on d.c. systems second-grade accuracy is obtainable if the iron ring is opened and closed (to reduce hysteresis error) immediately before a reading is taken.

Single-element Indicating Wattmeters

New indicating wattmeters of the dynamometer type have been developed for use on d.c. and a.c. circuits of ordinary frequencies. Their accuracy is unaffected by wave form or power factor, and any error due to normal temperature variations is claimed to be negligible. The movement is shielded from stray fields by its iron case. It is provided with fixed and moving coils insulated from each other, the former carrying the main current and the latter a current whose magnitude depends on the voltage. The moving coil is mounted on sapphire bearings, spring controlled, balanced for use in any position, and made dead beat by pneumatic damping. The weight of the moving parts is about 2.75 grammes. The divisions of the scale (8 in. for the switchboard type and 6 and 8 in. for the portable type) are nearly uniform.

The fixed coils can be wound for currents up to 30 A; above this range a.c. current transformers or d.c. shunts are used. For pressures exceeding 300 and up to 750 V an external resistance box is provided; above 750 V a potential transformer is required.

When wound for 5 A at 110 V, these wattmeters take approximately 2 VA for the current winding and 5.5 VA for the pressure circuit at maximum current and voltages. Their accuracy meets the requirements of British Standard Specification No. 89 for first-grade instruments.

Moving-coil Galvanometers

The demand for a robust and relatively sensitive pointer galvanometer has produced the Crompton Parkinson calibrated moving-col galvanometer with 6-in. and 8-in. scales for bench or wall mounting. Calibration is for direct indication of milli-amperes and millivolts. Windings have a resistance varying from 2 ohms for 15-0-15 micro-amp. to 2,000 ohms for 0.25-0-0.25 micro-amp.

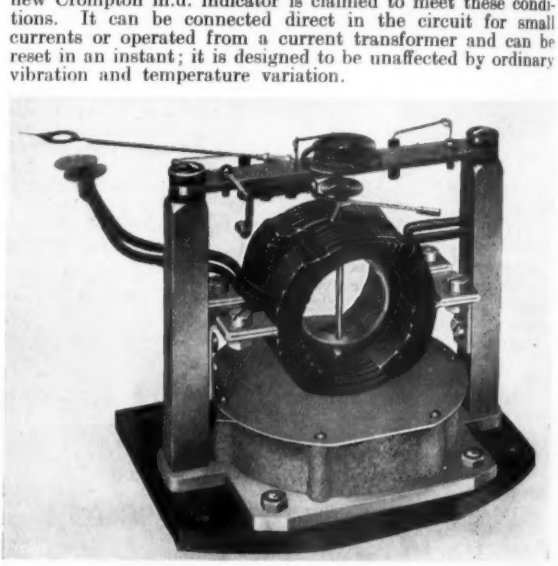
The standard instrument has a central zero, but a side or displaced zero can be provided for a range equal to the sum of the positive and negative maximum readings of a central-zero galvanometer having the same resistance, *e.g.*, a 2-0-2 micro-amp. winding can be calibrated for a 0-4 or 1-0-3 micro-amp. 40-ohm galvanometer. For higher sensitivity specially shaped pole pieces to give a displaced zero with wider divisions can be employed, increasing the sensitivity for null work by about 150 per cent.

An indicating wattmeter

It is claimed that with the exception of those supplied with undamped coils for ballistic work, galvanometers with a resistance of 40 ohms or more will not be damaged by temporary connection across the terminals of a 2-V cell. Provision can be made for the pointers to be set up to any part of the scale approximating to the value of a momentary current to be applied; the reduction of the angular movement of the pointer permits accurate determination of their value.

Thermal Maximum-demand Indicator

There has long been a need for an inexpensive British demand indicator which can be easily installed and reset. The new Crompton m.d. indicator is claimed to meet these conditions. It can be connected direct in the circuit for small currents or operated from a current transformer and can be reset in an instant; it is designed to be unaffected by ordinary vibration and temperature variation.



Movement of single-element wattmeter

This indicator consists essentially of two parallel bi-metal strips secured at one end to a moulded bakelite base plate mounted on felt pads, with their free ends connected by links and a connecting rod to a quadrant and a pinion movement, the spindle of which carries the operating pointer. Under ordinary temperature variations the two strips deflect equally and no movement is imparted to this pointer. Adjacent to one strip is a heating coil through which line current passes causing that strip to expand more than the other, and to deflect the pointer. The operating pointer pushes a m.d. indicator pointer, which shows the mean of the current over a period of fifteen minutes and is retained by friction at the highest point; the resetter knob can be locked. The scale is 3¼ in. long and graduated from 20 to 120 per cent. of full-load current and the instrument is contained in a black-enamel pressed steel case with front terminals.

Electric Shotfiring Apparatus

The Secretary for Mines announces that the "Magnet (1932)" and "Helsby (1932)" high tension magneto electric exploders submitted for test by the General Electric Co., Ltd., and British Insulated Cables, Ltd., respectively, have been approved for use in all coal mines to which Part II of the Explosives in Coal Mines Order of September 1st, 1913, applies.

Teaching Electric Cooking

Effective methods employed by the French E.D.A.

THE growth of the consumption of electricity in France, and the progress made by the industry, especially on the domestic side, is the result of organisation and originality. Gradually new buildings rise in Paris which are devoted to electrical propaganda, and what is particularly interesting is the fact that these publicity organisations are not concerned with direct profits, but, by aiding the industry generally, justify their existence and make their overhead expenses, somewhat on the lines of the British Electrical Development Association.

One of the most important of these organisations is the Société pour le Développement des Applications de l'Electricité (AP-EL), which was formed in 1922 for the general advancement of the industry. Its work is to advise and to advertise, and its recent activities have been very successful. "AP-EL" employs a staff of experts who advise electricians and manufacturers upon questions concerning the improvement of apparatus. The various sectors throughout France, as well as manufacturers, subscribe to the organisation which allows the mark "AP-EL" to be applied to any of the articles manufactured by its contributors. This mark is considered to imply quality and modernity. The most important part of the work consists in the organisation of publicity campaigns. At the present moment the "AP-EL" is concentrating upon the advertising of small electric water boilers (of one-litre capacity) for domestic use, while during the year they launch separate campaigns for heating, lighting, &c. The present campaign was launched on May 10th, and will continue until the middle of June. Every means of publicity is being used: cinema, wireless, competitions, posters, and a questionnaire. The films consist of animated cartoons and are being shown at all the principal theatres throughout France. Wireless publicity is being carried out by five stations.

The competitions are of two kinds; one for the consumer (a special one for children), and one for the sectors and electrical shops throughout the country. Lastly, a questionnaire for housewives and dealers is also being widely distributed.

A Demonstration Kitchen

Following the "AP-EL" activities, the Compagnie Parisienne de Distribution d'Electricité, is also in the field to increase the consumption of electricity. Of the many different means employed by the company, the most interesting are free cookery courses which are run for all those who have electrical apparatus installed in their kitchens. In 1931 some 8,000 housewives attended the courses, which are divided into two parts: lectures with demonstration, and practical courses where those attending actually do the cooking themselves.

The kitchen comprises six minor or smaller kitchens, each one equipped with an electric cooker with two plates (3,000 W), and an oven with a loading of 1,000 W. By means of two meters (one for the plates and one for the oven) graduated in kWh, the cook can see exactly how much energy is consumed for each dish. Each kitchen is also equipped with a 15-litre water heater.

The instructor works at the top of the large kitchen and uses two 1,000-W ovens, 3,000 W of hot plates, and a "cuisinière"—combined oven and stove (2,700 W). He also has a refrigerator. The lighting of the kitchen is indirect, and is carried out by ten 200-W lamps in reflectors. The kitchen is equipped with special heating, cooling and ventilating apparatus.

The company also has a laundry where demonstrations are given. In this there are four washing machines and hot and cold water apparatus, the former being provided by a special heater holding 200 litres, which raises the temperature of the water to 90 deg. C. All the courses are free, although those attending must be provided with special cards owing to limitation of space. The company also holds special courses for schoolchildren.

A schoolgirls' class in progress

"Tricity" Displays During the I.M.E.A. Convention

During next week's Convention of the I.M.E.A., at Cardiff, the British Electric Transformer Co., Ltd., will have on view a full range of "Tricity" cookers at its Cardiff showrooms. It has also arranged for a "Tricity" display, including the types of cookers hired out by the Cardiff Corporation, to be made in the Corporation Electricity Department's showroom windows.

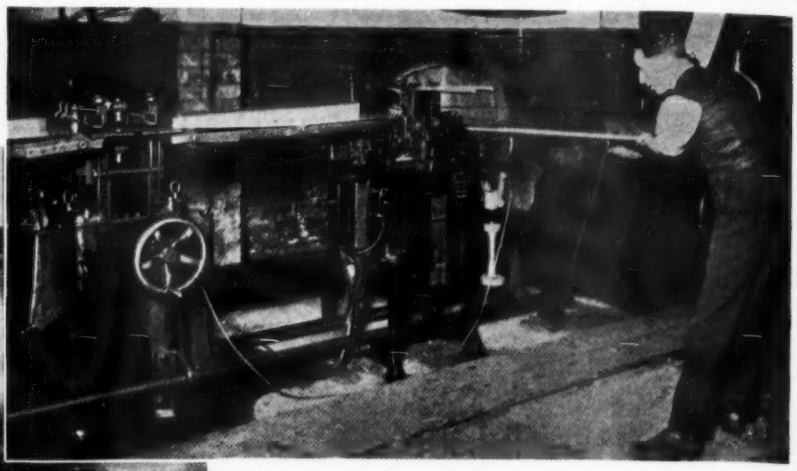
A general view of the demonstration kitchen in Paris described above

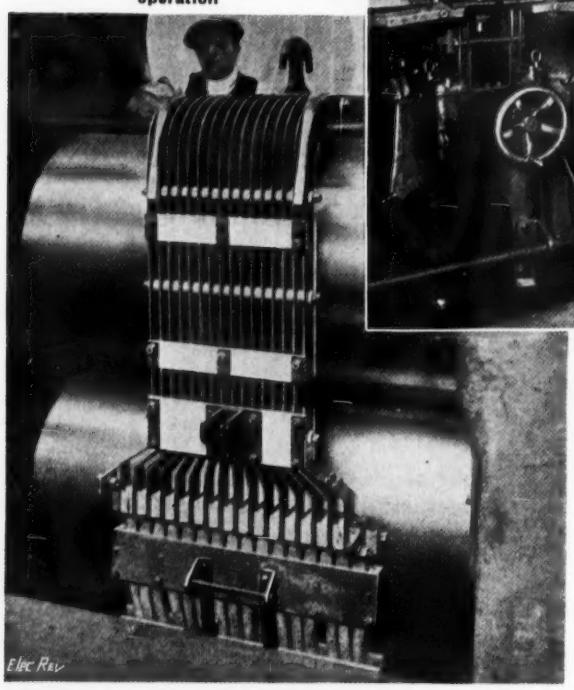
The I.E.E. Summer Tour

THE fair weather which invariably favours the Institution of Electrical Engineers' summer meetings has become proverbial, and last week was not an exception. Monday, on which there were visits to Leeds and Huddersfield and the excursion to Fountains Abbey, was one of the finest days enjoyed locally for some time.

Tuesday was if anything finer and warmer, when members set out by motor coach to inspect the pit-head works at Fryston, passing close by the Ferrybridge power station of the Yorkshire Electric Power Co. and through the model colliery village of the Airedale Collieries, Ltd.

(Right) A special electric welding machine employed in the Firth-Brown Strip Mills
(Below) An electrical heating device which brings the rolls used in the production of "Staybrite" steels up to the correct temperature before operation





The splendid pit-head baths stimulated keen interest. By means of steel ducting pre-heated and disinfected air is circulated through each of the 4,080 sheet-steel clothes lockers, and an enclosed gantry connecting the baths and lamp room with the pit top protects the men coming out from chill and damp, while boot-cleaning facilities include two platforms of electrically driven revolving brush machines.

The lamp room battery charging equipment (Ceag Miners Supply Co., Ltd.), the power houses containing the steam winders, turbo-generators, electrically driven ventilating fans, &c., and the canteen were all inspected in turn before proceeding to Dewsbury for luncheon at the Town Hall.

An Exhibition of Yorkshire Industry

There our host, the Yorkshire Electric Power Co., had staged an excellent exhibition of Yorkshire industry, typical of the wide range of products of some 22 firms, including English Electric, Crompton Parkinson, and George Bray electric motors, switchgear, and lamps; Birkby's "Bakelite" products and "Elo" ware; Jackson and Bayley glassware; Hopkinson and Blakeborough valves and boiler house fittings; and condenser and other tubes from the Yorkshire Copper Works, Ltd., which are equipped with electric melting furnaces and are the largest in Great Britain (120 acres) solely devoted to the manufacture of non-ferrous tubes.

The afternoon was spent at the Thornhill power station of the Y.E.P. Co. (engineer and manager: Mr. W. B. Woodhouse) described by us last week (p. 811).

In the system control and recording room at Thornhill is a diagram which indicates the position of the switchgear in the three power and 730 e.h.p. sub-stations.

Apart from direct consumers, the company supplies 69 distribution undertakings in bulk and its associate (Electrical Distribution of Yorkshire, Ltd.) holds 44 orders, covering an area of 1,200 sq. miles. In 1931 the simultaneous maximum load on the system reached 70,035 kW and the energy "sent out" totalled 229 million kWh, the average price received being now less than ¾d. per kWh.

On the return to headquarters at Harrogate, the official photograph was taken and dancing followed in the evening.

Industrious Sheffield

On Thursday morning a special train carried members to Sheffield, where the Neepsend power station was inspected.

Mr. E. Morgan manages the undertaking, which is erecting new plant at the Blackburn Meadows station. During 1931 over 232 million kWh was generated and nearly 22 million kWh purchased. The 83,583 consumers' connections aggregated 323,075 kW and their maximum demand reached 97,727 kW, the load factor being 35.21 per cent. The working cost was 0.5d. and the revenue 0.98d. per kWh sold.

After luncheon, as the guests of the Municipal Electricity Committee, a tour of the Tinsley, Atlas, and Norfolk steel works of Thos. Firth and John Brown, Ltd., was undertaken, during which the production of "Staybrite" steel was watched. A high-pressure, B. & W. boiler drum for Ford's works at Dagenham was also viewed.

The rolling mills in these steel works include two heavy electrically driven sets with rolls 32 in. in diameter and 5 ft. long. An 18-ton 180-V 15,000-A electric arc furnace is in use here capable of melting at least three casts every 24 hours; there are also 4-ton and 8-ton arc furnaces for carbon, alloy, and stainless steels, besides 500-lb. and one-ton high-frequency induction furnaces of the latest "Metrovick" type.

All the electricity for the furnaces is obtained from the works' power house, and the electrical equipment of the shops includes such special items as mill roll heaters and welding machines which join the ends of strips to make the processes continuous.

During the evening there was a concert at headquarters, followed by dancing, for those who did not visit the theatre.

On Friday morning the whole party drove to York to visit the beautiful cathedral, Guildhall, and Mansion House.

An instructive afternoon was spent in the modern well-equipped chocolate factory of Joseph Terry and Sons, Ltd., which is electrically driven, before the drive back to Harrogate.

A high frequency electric crucible furnace. Sheffield was the pioneer in the use of these furnaces for steel making

A reception in the evening by the president, Capt. J. M. Donaldson, and the chairman of the North-Midland Centre, Mr. R. G. Ward, and Mrs. Ward, which was followed by dancing and a cabaret, terminated the week's programme.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Heat in Industry

I read with much satisfaction your editorial bearing the above heading in this week's issue, and particularly the statement that "it is to the conversion of electricity to heat that we must look for most of the big loads of the future." There is no doubt whatever about this and manufacturers of industrial heating apparatus would do well to concentrate upon the development of their products.

In addition to the heat required for industrial processes there is also a big field which is now largely held by central heating engineers employing solid or liquid fuel. Those who argue against the use of electricity because only 3,412 B.th.u. can be obtained from a kWh, fail completely to understand the heating question. The designers of a central heating system have found it necessary to base their calculations upon a much greater number of B.th.u.'s than are required with an efficient electrical system, and if anybody cares to challenge this statement I can supply evidence in support of it.

The terms upon which many supply undertakings are now prepared to offer electrical energy for skilfully planned electric low-temperature heating systems, imposes a serious obligation upon those responsible for the erection of new buildings to consider the use of electricity in preference to the old-fashioned circulating pipes and radiators from a fuel-fired boiler. The battle is more than half won when the architect truly declares at the outset that he has an open mind and is ready to be convinced. It is then, among other things, a matter of his having the courage of his convictions. J. LESSER,

(City of London Electric Lighting Co., Ltd.).

London, E.C.1, *June 4th*, 1932.

Electricity Supply in Shoeburyness

This Council's attention has been drawn to a note which appeared in the ELECTRICAL REVIEW published on May 27th with regard to an offer by the Southend Corporation to the War Department for a supply of electricity in bulk to the Government premises at Shoeburyness and also to this Council.

At their meeting last Tuesday I was instructed by the Council to point out that, in the event of terms being agreed between the War Office and the Southend Corporation for a bulk supply, such supply would be offered through this Council as the distributing authority under the Shoeburyness Electricity Special Order, 1927. A. H. GREGSON,

Clerk to the Shoeburyness U.D.C.

Southend-on-Sea, *June 3rd*, 1932.

A Domestic Consumer's Criticism

I read with particular interest the short article bearing the above title in your issue of May 27th, and am prompted to add a little to this subject, which I and my many friends, all users of electricity, consider to be important. I refer to the lack of interest taken by many responsible for electricity supply in what I call immediate or emergency service that might be effectively carried out at home, without having to send to the department concerned or the local electrician who may not at the time be available.

To cite an instance: the other evening I went to switch on the light in the hall of my home, and upon doing so there was a sudden flash and everything on the ground floor was plunged into complete darkness. I soon discovered that the local fuses had given out, and until they were renewed darkness had to remain with all its inconveniences. Luckily I had a little fuse wire on hand, and knew how to perform this simple operation which took me but a few moments, after which all was well again when I had replaced the faulty lamp which caused the trouble.

This is only one of the many similar troubles I have experienced, and I think the time has arrived when more attention should be given in educating the user in this simple operation upon which so much depends, and I do hope that now many women are taking an active part in the use of electricity in the home and people are being educated to adopt it through the lay Press, a more practical action will be taken in this matter and so avoid, what one may call a "temper," by having to wait the convenience of a service man. In the North Metropolitan area they have spent largely upon such a service, which I believe has proved a very successful and profitable policy indeed. CORRIE W. BENHAM,

Harrow, *May 31st*, 1932. Member E.A.W.

Name Plates

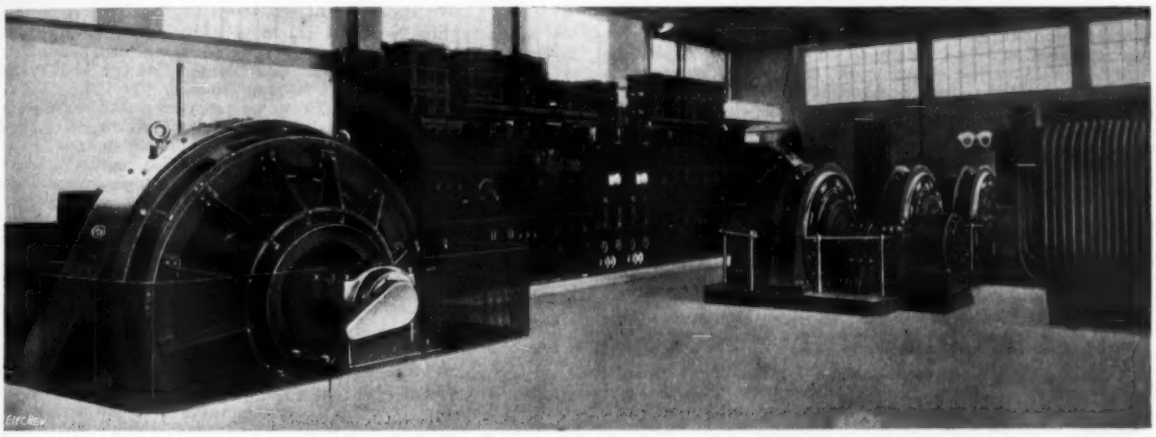
The main object of fixing a name plate to a machine is twofold—to herald its maker and to give distinguishing details. Yet how often do manufacturers lose this chance of publicity and at the same time make it difficult for interested persons to obtain information that should be readily available!

I remember seeing, during an official tour of a large works some years ago, a centrifugal pump by a well-known maker which attracted attention by its trouble-free operation of a certain process. The party admired its excellent performance, but our guide was unable to give us the name of its maker, and there was no name plate. Eventually, after consulting records, the makers were identified, but much valuable publicity might have been lost by the omission of the name plate.

Some makers rely upon the general appearance of their products to identify them, but without distinguishing plates this is surely not logical, as two competing makes of similar machines may be operating side by side.

The casting of the maker's name in an integral component avoids to a large extent the possibility of confusion as to its origin, but, in order to give effective publicity, the lettering should be arranged so as to be easily legible when coated with grime or oil. The position of such plates should be chosen with an intelligent appreciation of the probable passage of persons in relation to the final situation of the machine. Serious consideration should be given by manufacturers to name plates on both the grounds mentioned. E. L. PARRY.

Hounslow, *June 1st*, 1932.



The No. 2 finishing mill motor (2,500 h.p.), rotary convertors and main switchboard **(See page 838)**

The Bergmann Overseas Branches

We wish to take the opportunity of correcting the statement made on page 829 of your June 3rd issue with regard to our Berlin works.

Mention is made that their foreign organisations are being liquidated, including London. This is not correct, as a decision has been made to carry on the English business as usual.

BERGMANN ELECTRIC CO., LTD.

London, S.W.9, *June 4th*, 1932. F. Williams, *Secretary*.

Shoddy Motor Wiring

While not agreeing with Mr. R. A. Mallet in all his statements, I congratulate him on his spirited defence of the British small motor industry, which is certainly the spirit which is necessary to oust shoddy machines from the market, but, unfortunately, the motor in question is not a cheap machine, but one which is well sponsored in this country and has had a good name in the past.

While agreeing with Mr. Mallet's statement that far too many manufacturers of machinery buy their motors solely on price without any consideration of the quality, we must admit that most of such manufacturers are at the mercy of the electrical industry, and do, quite reasonably, buy on prices only and the reputation of the firm in question, and probably

take as their slogan, " Why pay through the nose for a British article? "

This attitude is unfortunately prevalent throughout the country, and the " Buy British " campaign is a fallacy. The only way I see clear is for some scheme to be adopted to ban all shoddy machines and have honest competition.

There are certain standards set by the authorities for electrical manufacturers and contractors, *viz.*, Board of Trade Regulations, &c., and I fail to see why shoddy machines should be foisted on the public who are ignorant of such matters, and who need every protection from such " death traps."

Whilst not assuming that the small motor industry is engaged in turning out junk, I am pleased that Mr. Mallet agrees that my complaint is not without grounds, and I wish the small motor industry of this country good luck in its efforts to eliminate junk if such efforts are being made.

H. HARRISON,
Manager, G. G. Martinali.

Southend-on-Sea, *June 3rd*, 1932.

It is an amusing coincidence that on page 813 of your issue of June 3rd, on which you have been good enough to publish my letter under the above heading, there should appear a photograph of a part of Messrs. Ferranti's works, showing a total of thirty-one small electric motors, no fewer than twenty-five of which are of our manufacture. The illustration gives added force to the argument in my letter, that British motors are the best in the world.

R. A. MALLET,
Director, Normand Electrical Co., Ltd.

London, S.W.4, *June 3rd*, 1932.

E.H.P. Switchgear

Judging from " Anon's " letter which appeared in your issue of June 3rd, my letter of the previous week needs further explanation. The reference to " countless trials and tests " applies to the experimental work necessary to build up data from which circuit breakers are designed. These tests should be distinguished from proving tests which are carried out on samples of final designs. The latter tests establish full records of performance in all details and certainly constitute a " measure of efficiency " comparable with the data available as a guide in the selection of other plant.

New and improved types of breaker cannot be developed commercially on the basis of past experience. To quote typical examples: Without experimental testing, the gas and oil blast breakers would not have reached the present stage of fruition. It is impossible to predetermine the performance of circuit breakers with the same exactitude as applies in the case of transformers and electrical machinery because of the variations which are inherent in plain arc rupture under oil. In the case of machinery this exactitude is largely made possible by the accumulation of data produced by many investigations and the lack of variation in performance under fixed conditions.

" Anon " leads us to believe that breakers are designed which can and do perform their prime duty with a factor of safety without proving tests. It would be interesting to know what proof he can offer to substantiate this statement. Cases are on record where circuit breakers supplied by makers of experience and standing have proved to be unsatisfactory when tested in the field by the user. This does not support " Anon's " contention. It is a great pity that one who is so sure of his ability to design breakers which require no proving tests has not revealed his identity to the public.

" Anon's " bridge analogy is not correct, because earthquake conditions are abnormal and not analogous to the short-circuit conditions imposed on a circuit breaker. The facts that the maximum short-circuit stress occurs very infrequently and that there exist (as " Anon " states) certain phenomena which may wreck the breaker do not excuse the designer in neglecting to cater for them. It is worth while recalling that, although the stresses in a bridge are calculable, the Sydney Harbour Bridge on completion was tested by seventy locomotives.

The jibe at testing abroad and at American engineers is a really comical finish to an essay on good manners and smug complacency.

I. J. BAMBER.

Levenshulme, Manchester, *June 6th*, 1932.

Power Factor Improvement

My attention has been drawn to a letter in your May 27th issue, by Mr. James Gray for the Electric Construction Co., Ltd., regarding my article on " Motor Control and Power Factor " which appeared in your issue of May 20th, and in reply I would say that the subject matter was based on test results of machines actually made and placed on the market in 1921 and 1922. The scheme was ridiculed on account of the cost of condensers at that time and also to the " boost " which certain firms were giving to the synchronous induction motor.

Therefore, instead of having re-discovered the advantages of their invention, I had anticipated them by several years.

D. DYSON RAYNER.

Prestwich, Manchester, *June 4th*, 1932.

Parliamentary Notes (BY OUR SPECIAL PARLIAMENTARY REPORTER)

ON June 1st, Mr. Duncan asked the Minister of Transport whether, in view of modern developments in the technique of electrical distribution and the increased importance of communication by road, he would undertake a review of the existing law as regarded the distribution of electricity and the relations between electricity undertakers and road authorities with a view to bringing the law up to date; whether he was aware that street-boxes and sub-stations had been placed in and under streets and roads in this country without any payment by the electricity undertakers to the owners of the ground; whether he would amend the law so that the provisions of the law relating to poles carrying electric cables should apply to these street-boxes; if any limit was imposed by his Department to the size of street-boxes and sub-stations used for the purpose of distributing electricity above and below ground; and, if not, would he consider an amendment of the law so that some limit might be fixed.

Mr. Pybus said that authorised undertakers were entitled, under the existing law, to place street-boxes in or under public highways without payment, and no limit was imposed as to the size, but the road authority had a veto on the erection of street-boxes above ground. When the Electricity (Supply) Bill of 1926 was before Parliament an amendment of these provisions was discussed but was rejected, and he did not contemplate the introduction of legislation on the matter.

The Leatherhead Undertaking

On June 1st, Mr. H. Williams asked the Minister of Transport whether the approval of his Department was obtained by the London and Home Counties Joint Electricity Authority for its purchase for the sum of £312,540 of assets belonging to the Leatherhead and District undertaking standing in the books of the latter at £230,148.

Mr. Pybus said that the consent of the Electricity Commissioners was given to the acquisition by the Joint Authority of the Leatherhead undertaking as a going concern after they had satisfied themselves that the price, in the circumstances, was reasonable.

The Severn Barrage

On June 1st, Mr. Louis Smith asked the Minister of Transport whether he had now received the report of the Committee of the Economic Advisory Council investigating the question of the Severn River barrage; if not, when he expected to receive it; and what had been the cost hitherto of carrying out these investigations.

Mr. Pybus said that the present stage of this inquiry had now been completed, and he understood that the Severn Barrage Committee hoped shortly to receive a report thereon from the expert sub-committee under whose supervision these investigations had been carried out. The expenditure incurred since 1925 amounted to about £21,000, exclusive of £27,000 spent on the marine survey of the Severn estuary by the Hydrographic Department of the Admiralty. As this survey was carried out in substitution for work which would otherwise have been done by that Department there had been no increased charge to public funds on that account.

Gas or Electricity?

On June 2nd, Mr. Hutchison asked the Minister of Health if he would state the number and names of urban district councils in Essex which imposed on their tenants a condition that they must either discontinue the use of gas in favour of electricity or run the risk of being ejected from their homes; and whether his Department discouraged this practice, in view of the fact that these houses were constructed in part with public money.

Sir Hilton Young said that the information sought in the first part of the question was not available, as local authorities were not required to inform him of their methods of management of their estates. He had no reason to suppose that such a practice was common, and, if consulted on the matter, would certainly deprecate arbitrary action of the kind described.

Railway Electrification Costs

In the House of Lords on June 2nd, Lord Monkswell asked the Government if it would ascertain and publish full details of the cost of the electrification of the Southern Railway, both capital costs and working expenses. He said that the more he studied that question the more sceptical he became about the advantages of the electrification of any surface railway. He thought that the reason for the unwillingness of the Southern Railway Co. and others to publish full figures of the cost of electrification was because experience had shown the system to be a failure, and the persons responsible for it were reluctant to admit the fact.

Lord Plymouth, Parliamentary Secretary to the Ministry of Transport, said that according to evidence given by Sir Herbert Walker before the Committee of Inquiry on London Coach Services, the amount spent by the Southern Railway up to date on electrification was about £10,000,000, of which approximately one half had been spent since 1925. The Government was not in possession of the full details of this expenditure, and it was not considered that any useful purpose would be served by publishing the figures even if the company was agreeable to that course. It was absurd to suggest that the railway companies at present would be prepared to embark on the vast capital expenditure which a conversion of this kind would entail unless they were absolutely satisfied that there was some reasonable expectation of a return on the capital.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

An Attractive Ceiling Switch-socket

The extreme ease of operation and attractive appearance of the new Tucker ceiling switch-socket makes it a useful addition both in the home and the showroom. In the first case it is admirably suited as a switch over a bed, while in the showroom the combined socket can be used to considerable advantage when it is necessary to change the lamp to be controlled by the switch, only the substitution of a different plug being necessary.

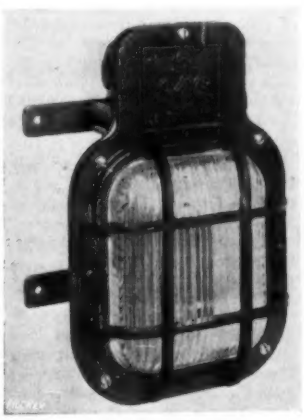
Tucker switch-socket

The construction is much the same as that of the "Sincord" model which we described on February 26th, as the operation is controlled by pulling a single 7-ft. cord hanging from the switch, but the new model—which, incidentally, the makers claim to be the first of its kind marketed—has a 5-A B.S.S. 2-pin plug fitting into the side of the base.

If the switch-socket is desired for wall mounting a special hook operation model can be supplied by the makers, who are MESSRS. J. H. TUCKER & CO., LTD., King's Road, Tyseley, Birmingham.

A New Prismatic Bulkhead Fitting

The main feature of the new G.E.C. prismatic bulkhead fitting is the wide lateral distribution of light, and it is therefore likely to prove very useful for illuminating passages and tunnels. The fitting is made of cast iron and is suitable for either wall or ceiling mounting. The glass is cemented into the front ring and this is, in its turn, screwed to the body of the fitting and kept watertight by a rubber gasket.

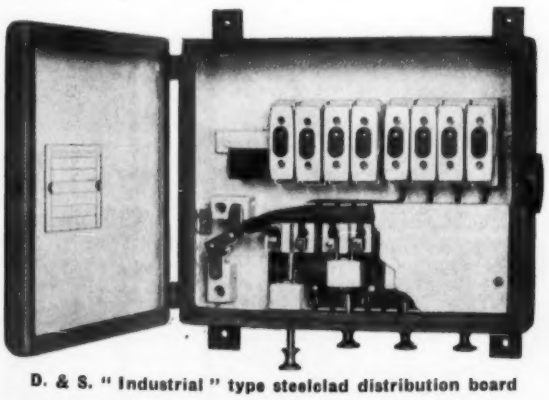


Prismatic bulkhead fitting

The prisms, which are designed to give the maximum spread of light and a minimum projection, are on the inside of the glass; the outside, being smooth, does not collect dust and dirt. The fitting is supplied by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, with b.c. or e.s. porcelain holder and is suitable for 40- or 60-W gasfilled lamps.

New Switches

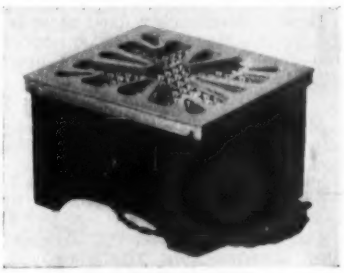
MESSRS. DORMAN & SMITH, LTD., Salford, were the original makers of sliding type switches, and for many years their "M" switch has been used for circuits up to 250 V. Within the past few weeks, this company has obtained provisional protection of a sliding pattern switch which is a considerable advance on previous practice in this line. By arranging the moving insulator so that the contact blade slides within it, the speed of break has been doubled; and by employing a new type of blade, contact efficiency has been increased very considerably. These switches—known as "N" switches—are supplied either single- or double-pole, with or without fuses, in ironclad cases, and are now used in combination with the "Factory Damper" fuses in the D. & S. "Industrial" type distribution boards. The company states that economies in manufacture have made it possible to market them at low prices.



D. & S. "Industrial" type steelclad distribution board

A Low-priced Hot-plate

The extremely low price is an outstanding feature of the hot-plates being manufactured by GIRLINGS, LTD., Electricity Works, Maldon. They are built up in a square sheet metal frame with a cast iron grid top and are designed for strength combined with light weight. Four models are made: types B¾ (¾ kW) and B1 (1 kW), each with a single heat; B2, a two-heat, 2-kW model; and BA2, which is the same as B2 except that it has three heats.



A "Girling" hot-plate

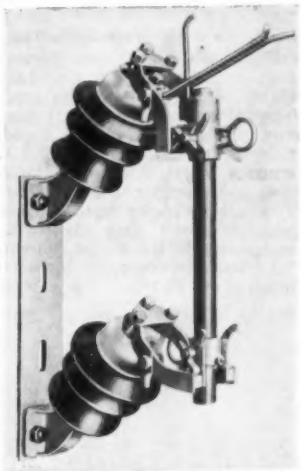
An Electric Sheep-shearing Machine

With the development of the grid system electricity on the farm may be expected to become the rule rather than the exception, and the farmer owning a big flock of sheep will readily appreciate the new electric shearer manufactured by the COOPER-STEWART ENGINEERING CO., LTD., 136-7, Long Acre, W.C.2, which is not only made for standard supply voltages, but also for use with a 6-volt car battery or a home lighting set. It is economical to run, being rated at 65W, and the price is little more than the makers' "One Man Power" shearer. During a test it removed 12 lb. of fleece in less than five minutes, and it is not fatiguing to use, as it weighs less than 5 lb. The shearer can easily be converted into a clipper by changing the bottom plate. It is supplied with 20 feet of three-wire rubber covered lead cable, one shearing comb, and a cutter. The body of the machine may be earthed.

Outdoor Switchgear Developments

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, has designed three new switchgear units on simple and inexpensive lines for use on rural or suburban overhead distribution system up to 11 kV.

The expulsion type fuse links, which comprise the first unit, are suitable for the protection of transformers up to 200 kVA on rural or suburban lines. The fuse-holder consists of a porcelain barrel fitted with a contact at each end, the lower contact being capable of swivelling in a vertical plane on a hinge mounted on the lower of the two insulators holding the fuse in position. Both contacts on the fuse barrel are fitted with eye rings into which a hooked operating rod can be inserted from ground level for pulling the fuse and link out of the top insulator contacts. In this position the lower eye ring becomes accessible and the fuse link can be removed for rewiring by inserting the hook of the operating rod and giving a sharp upward jerk.



G.E.C. expulsion-type fuse link

Arcing horns are fitted to the upper contacts of the fuse link and to the fixed contact of the upper insulator; these horns can, it is claimed, rupture currents up to 8 A at 11 kV.

The fuse link is mounted on two insulators inclined at 45 deg. to the vertical, so that when closed the barrel is in an upright position. The fixed contacts on the insulators are bolted and not cemented to the insulators so that replacements can easily be effected.

The second new unit, a pull-down combined switch and fuse is designed to protect transformers up to 200 kVA on 11 kV rural overhead lines, and can be used with a simple form of "H" pole.

The switch is gang-operated, the three phases being mounted on a rigid framework hinged at a point about midway on the pole, counterweights being provided to facilitate operation. The fuses can be examined or rewired at ground level.

The fuses are again of the expulsion type and the porcelain barrels are provided with rain sheds. Arcing horns are fitted to the contacts of the fuse barrels and to the contacts on the insulators, so that the unit can be used as a horn air-break switch, and can be locked in the open or closed positions.

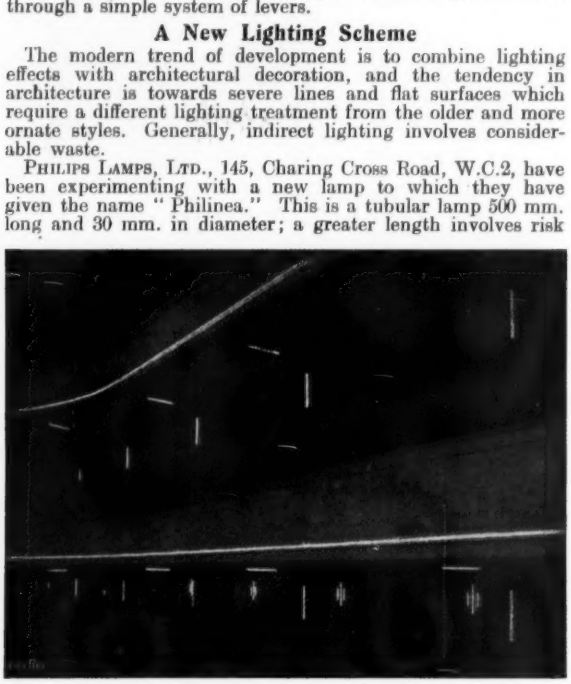
A compact and rigid form of switch fuse for mounting on single wood poles has also been developed for the protection of 11-kV lines up to 200-kVA capacity. The framework comprises a channel-iron base attached to the pole by a U-shaped clamping band and two tie bars. To the channel base are attached the three fixed insulators, the top caps of which carry the fixed contacts of the switch, the fixed arcing horns, and the top contacts for the fuses, while to the lower caps of the fixed insulators are attached the bottom contacts for expulsion-type fuses.

Bearing brackets are fixed on each end of the channel base for the rotating shaft which carries the moving insulators and contacts, the shaft being operated from ground level through a simple system of levers.

A New Lighting Scheme

The modern trend of development is to combine lighting effects with architectural decoration, and the tendency in architecture is towards severe lines and flat surfaces which require a different lighting treatment from the older and more ornate styles. Generally, indirect lighting involves considerable waste.

PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2, have been experimenting with a new lamp to which they have given the name "Philinea." This is a tubular lamp 500 mm. long and 30 mm. in diameter; a greater length involves risk



Philinea lighting in a theatre

of breakage while a shorter one necessitates too many connections. The ends of the lamp are flat and the connections are at the back of the lamp, one at each end. The wattage is 40 W on voltages from 100 V to 260 V. It is made of clear, frosted, or coloured glass, and does not get hot.

New Ediswan Accessories

There are several new developments in switches made by EDISON SWAN ELECTRIC CO., LTD., 123, Queen Victoria Street, E.C.4. Starting with the smallest, a new moulded switch lampholder is being manufactured which embodies the patent cord grip and "Ryerome" alloy non-rusting springs. Solid plungers are incorporated and the "J" slots are reinforced without metal insertion. The illustration shows a sectional view of the holder without switch, contained above the holder. The latter is of the rapid make and break type, and the whole may be obtained with or without the skirt. The skirted holder complies with the Home Office regulations.

Further developments have taken place in the 15 A 250 V ironclad switch fuse. The new model is the "Junior" pressed metal-clad "Splitter" unit embodying one 15 A d.p. switch and four 15 A s.p. fuse units. As this is also used as a fuseboard a special fastener has been included in the lid.

The Ediswan "Junior" 15 A d.p. ironclad fuseboard is a newcomer to the range. It can be used for 250 V a.c. or d.c., and the casing is built up from a combination of cast iron and sheet steel having detachable conduit plates at the top and bottom. Each bank of fuses is mounted on a hinged batten to facilitate wiring, while plenty of space is allowed for incoming and outgoing cables. Circuit wiring is carried out from the front; the main terminals are at the back but are easily accessible when the hinged battens are swung forward.

A Mystery Lamp

"How does it work?" is the first thought on seeing the "Wizard" glass lamp. There are apparently no connections at all, and such a lamp, placed in a prominent position in a shop window may be depended upon to attract attention. The connections to the lamp are taken along the edge of the glass, and concealed by a special compound resembling the glass.

The lamp can also be obtained with an etched design on the glass; the base is chromium plated, making a plain but decorative table lamp for the home. It can be obtained from 20TH CENTURY ELECTRICAL, 30, Gerrard Street, W.1.

The "Wizard" lamp with shade removed

Insulating Tape

The new "Parofilm" insulating tape manufactured by MESSRS. O'BRIEN & HULME, 78, George Street, Manchester, is claimed to have many advantages over the ordinary tape. It is composed of a paraffin wax amalgam made up in the form of ribbon. The adhesive qualities are such that under slight tension and the warmth of the hand it is enabled to cling to itself, while it is claimed to be unaffected by weather or soil and always to remain pliable. It is also unaffected by acids or alkalis, and will withstand up to 450 V per mil, as compared with 250 V per mil with ordinary adhesive tape.

A New Iron

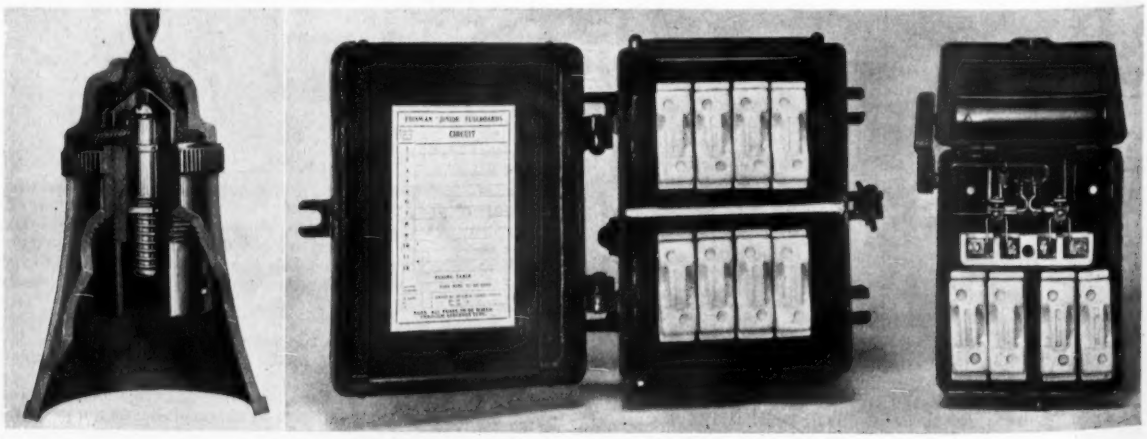
SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.2, have recently placed on the market the "Victor" electric iron rated at 450 W and weighing five pounds.

The wooden handle is designed to prevent wrist ache, and an adjustable thumb-rest is provided to suit the needs of the user. The finish is of nickel-plate, and the iron is provided with two yards of circular flex with a "Bakelite" connector and lampholder.

Siemens "Victor" electric iron

A Damp and Chemical-action Resisting Cable

Under the name "Protégé," the SOCIÉTÉ DES CABLES DE LYONS is making a cable for use in damp places. The new cables are made with h.c. hammered copper conductors enclosed by a vulcanised rubber sheath, which is in turn covered by a lead tube, which is given a coating of sulphide of lead, followed by a layer of an acid-resisting material, two layers of impregnated paper and finally an impregnated textile covering.



A new Ediswan lampholder, fuseboard and switch-fuse

Notes on Estimating. By H. Neale

A REALLY good tender can win half the salesman's battle for him, just as an indifferent, ill-thought-out effort can make his task more difficult. There is, then, a technique of estimating of scarcely less importance than the technique of salesmanship.

What type of tender is likely to interest an inquirer? One, it can be said safely, in which the prices and data are presented in a logical, easily assimilated manner. To this end inquiries should be dealt with according to a definite plan, of which the following is an example:—1. Careful examination of the inquiry. 2. Decision as to the type of machines, switchgear, &c., to be offered. 3. Consideration of points to be made in the tender. 4. Setting out the prices and information in the tender to the best advantage.

With regard to (1) the inquiry should be read carefully, including any printed instructions which frequently appear on inquiry forms. To overlook such instructions as "tender to be in duplicate," "prices to be less 2½ per cent. cash," &c., causes annoyance to the inquirer and may possibly disqualify the offer. The matter involved in (2) may be settled by the inquiry itself, failing which the duty, type of drive, &c., should be considered and suitable machines and switchgear offered. If alternatives are proposed, the reasons for, or advantages of, such alternatives must be clearly explained in the tender. Interchangeability of machines should be carefully reviewed. Where it is possible by slightly altering horse-powers or mechanical arrangements to offer interchangeable machines, this should be done as an alternative scheme.

Under (3) the technical merits of the machines and switchgear offered should be considered, with special reference to the particular drive, duty, or situation for which they are needed. Details of similar installations carried out should be collected for inclusion in the tender, together with particulars of factories, power stations, &c., in the inquirer's area, where plant similar to that offered may be seen running. If the inquiry comes from abroad, the fullest possible information of the gear offered must be given, ensuring that the inquirer is not left in doubt on any point to avoid any necessity for correspondence or cables on this account.

Arranging the Matter

Coming to (4) it is not sufficient for a tender to simply be correct from a technical point of view and to contain all the prices and information called for. A really first-class tender consists of the arrangement of this matter to the best possible advantage from the point of view of its appeal to the inquirer. Thus the presentation of the prices and data must follow a logical sequence as far as is practicable.

In the case of a tender for, say, a works electrification, a suitable layout is as follows:—

Introductory remarks, reference to visits of representatives, &c. A brief description of how the subsequent matter is arranged. A brief outline of the general scheme on which the tender is based; this must explain reasons for the inclusion of any special machines or switchgear, suggestions as to any structural alterations advisable, &c. An index to the various sections of the tender, if it is large enough to render this advisable. A list and description of enclosures. A price summary showing totals for various sections and a grand total contract price. The tender proper, *i.e.*, description of and price schedules for machines, switchgear, wiring, &c.; no hard and fast rules can be given for the arrangement, which must be governed by the particular requirements. The delivery, despatch, and conditions of sale particulars.

Even for comparatively brief tenders for standard motors and control gear it is advisable to study the presentation of the data. Where two or more items of motors of varying powers and/or speeds, &c., occur, scheduling should be employed, one general description serving them all. This presents the information in the most concise manner and obviates dreary repetition. Different types of machines may be embodied in the one schedule, *i.e.*, it may be arranged to cover different windings of machines (slip-ring and squirrel-cage) and different enclosures (totally enclosed, enclosed ventilated, &c.).

A Minimum of Detail

I do not advocate schedules which are too comprehensive, however, as these are liable to become so complicated as to be an annoyance to an inquirer rather than a help. The following, however, is a typical example of a schedule arranged to cover varying types of machines. The necessary description of the various types should precede the schedule.

Drive.	No.	Rating.	B.H.P.	R.P.M.	Type.	Enclosure.	Accessories.	Starter.	PRICE, Each Motor.	PRICE, Each Starter.
Lineshaft	2	Cont.	30	720	S.C.R.	E.V.	Pulley, 18 × 12 and sliding base	Oil-immersed star-delta	—	—
Crane hoist	1	½ hr.	15	580	Slip-ring	E.V.	Free shaft extension	Drum controller	—	—
Wood-working machine	1	Cont.	5	1,450	S.C.R.	Totally encl.	Full coupling	Air-break star-delta	—	—

A further column may be added for the total price per item to facilitate the computation of the schedule total where applicable. With respect to the type of starter the detailed description of each type will, of course, have been given preceding the schedule.

The next point to study is the manner adopted in addressing the inquirer. In brief standard tenders to, say, resellers, in cases where elaboration is not expected, the estimator should observe that it is possible to be businesslike without introducing bluntness or appearing brusque.

In the presentation of technical details the adoption of an "academic" manner should be avoided. An inquirer is usually interested in the practicable application of electrical machinery to his own particular needs, and while appreciating any technical points raised, does not desire to read a technical treatise which is of no practical value to him.

Relay Switching

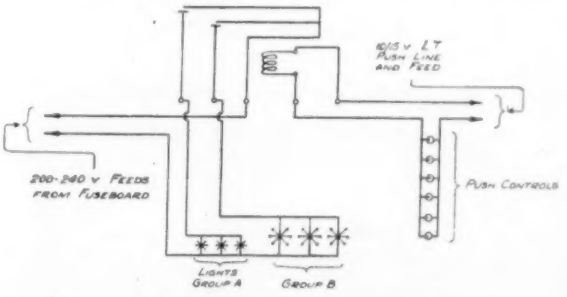
THE reconstruction of the Italian Embassy premises in Grosvenor Square, W.1, has afforded an appropriate opportunity of incorporating an unusual method of switching, which is of Italian origin, in the electric lighting scheme. The installation is being carried out by the Bective Electrical Co., Ltd., and the Zois method of wiring which is being used seems to have advantages over the ordinary looping-in system.

The whole of the switching has been arranged on the push-button relay principle in a manner which is novel to this country. In place of the usual type of switch, whether of the single-pole, two-way, or intermediate patterns, very neat push-buttons are used. They are small in dimensions and are simply clipped on to provide ready accessibility.

These pushes, which are made in various designs for flush or surface mounting, control small contactors which are situated by distribution boards or in other suitable positions. The contactor coil is operated at 10/15 V and the higher voltage contacts are brought into action through small insulated cams connected to push rods. The cables carrying the normal pressure are only wired between the plug lighting points and the contactor positions. Switch lines and feeds which operate the contactor coils are only run in good quality bellwire, and a considerable saving in the cost of cable is effected.

For controlling one or more points from various locations, only two push lines are run in parallel between any number of push positions. Intermediate switch wires, which would normally be necessary, are entirely eliminated. A push 1 in. in diameter can be recessed in the architrave of a doorway, where ordinarily a two-way switchplate is necessary.

The diagram shows the wiring arrangements for controlling two or more individual lighting points from one push position, or, alternatively, from a number of push positions, all of which are wired in parallel. When one push only is installed



The Bective (Zois) wiring system

the cycle of operation would be as follows:—1st depression, "A" group "on"; 2nd depression, "B" group "on"; 3rd depression, "A" group "off"; 4th depression, all "off."

Where luminous indicators are required, over the switches small low-voltage lamps are installed in special holders.

The Bective (Zois) system of wiring covers many applications, including alarm systems, signalling and motor starting.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Portable Electric Lamp Casings

As a sequel to an inquiry held on November 27th into an application of the Ever Ready Co. (Great Britain), Ltd., and the Efandem Co., Ltd., for an Order requiring the marking of imported casings for dry and secondary batteries, portable electric lamps, lanterns and torches (fitted with a battery or not), the Standing Committee (General Merchandise) of the Board of Trade has issued a report (Stationery Office, 2d.) to the effect that it is satisfied that a case has been made out for the making of an Order and considers that the indication of origin should be applied by impressing, incising or embossing. It is recommended that the Order should come into force on January 1st next or three months after it is made, whichever is the later.

The E.D.A. June Programme

In the June sales and publicity programme of the British Electrical Development Association special attention is given to the electric cooking campaign which is now in full swing. Illustrations and prices of campaign poster and poster stamps are included, together with the prices of the booklets on electric cooking, and on "How to Demonstrate an Electric Cooker." The window display for the month is a simple and effective display of electric cookers which members are urged to install in connection with the cooking campaign. The suggested local advertisements also relate to the campaign. A price list of literature and posters is included.

The E.D.A. June window display

The G.E.C. in South Wales

In view of the I.M.E.A. Convention next week a booklet received from the General Electric Co., Ltd., is of particular interest. It is entitled "The G.E.C. in South Wales," and contains numerous excellent illustrations relating to representative installations carried out by the company in the area. In the introduction a description is given of the company's branches at Cardiff, Swansea, Bristol and Gloucester, with details of their growing activities.

Tax on U.S. Electricity Supply Companies

The United States Senate has voted a 3 per cent. tax on the gross receipts of the electric power companies, which is estimated to yield $51,000,000.—*Reuter* (Washington).

An Electrical Exhibition at Okehampton

The West Devon Electric Supply Co., Ltd., is holding from June 14th to 18th an electrical exhibition at the Drill Hall at Okehampton.

Floodlighting of Edinburgh Castle

On the occasion of the General Assembly of the Church of Scotland, Edinburgh Castle was completely floodlighted for the first time. Experimental floodlighting of part of the Castle was carried out during the International Illumination Congress last autumn, but the scheme for this event was extended to the south and west side. The installation, which was carried out jointly by the Edison Swan Electric Co., Ltd., and the General Electric Co., Ltd., comprised 50 distributing type floodlight projectors, employing 1,500-W ordinary gasfilled lamps, 12 wide-angle rectangular flood lanterns fitted with similar lamps, eight highly concentrated projectors, with 1,000-W projector lamps, and 50 long range projectors, employing 1,500-W lamps. The first-named units were used for lighting the majority of the bastions, surrounding walls, and battlements from a comparatively short distance, i.e., in the neighbourhood of 100 to 150 feet. The second group was employed on certain buildings where a very short distance of throw was available, while the third group was used on the surrounding wall and buildings at which the length of throw was approximately 250 feet. The long range projectors were employed mainly on the Half Moon Bastion, the Argyll Tower and the Shrine. The connected lighting load for the complete installation was 176 kW.

Recent Contracts

The Compagnie Française de Tramways et d'Eclairage Electrique de Shanghai has recently placed an order with Messrs. Sulzer Bros. for an engine to develop 11,400 b.h.p. normal, 13,100 b.h.p. maximum output. When this engine is installed the Shanghai station will regain its position as the highest powered Diesel generating station in the world with a continuous service rating of 42,600 b.h.p. and a peak load capacity of over 50,000 b.h.p. The new Sulzer engine will be of the double acting two-stroke type with eight cylinders 760 m.m. bore by 1,200 m.m. stroke, and will give its rated output at 136 r.p.m. Messrs. Sulzer Bros. have also obtained an order for a 1,000-b.h.p. engine for the Constanza Harbour Authorities. This is a six-cylinder four-stroke solid injection engine running at 215 r.p.m. A similar engine has also been ordered by the Alto Alentejo Hydro-Electric Co. (Portugal).

The General Electric Co., Ltd., has received contracts from H.M. War Office and the Great Western Railway for twelve months' supply of electric lamps of various types.

An Electrical Exhibition at Shoreham

An electrical exhibition, organised by the Shoreham & District Electric Lighting & Power Co., Ltd., was held last week at St. Mary's Hall, Shoreham. Cooking demonstrations were given daily, and there was a comprehensive display of all the latest electrical labour-saving devices.

Irish Free State Electrical Imports

A very quiet tone continues to exist in the electrical trade in the Irish Free State, the imports of electrical machinery, fittings, and apparatus during March last having amounted to £50,097, bringing up the total for the three months ending with March last to only £145,898, as compared with £181,750 in the corresponding period of last year. The details of the imports are appended :—

	January–March. 1931. £.	1932. £.
Electrical machinery	50,541	46,652
Electrical wires and cables	28,512	21,014
Wireless sets and parts	30,001	31,491
Electric lamps and parts	16,141	12,506
Other electrical goods	49,905	32,675
Copper wire	6,650	1,560
Total	£181,750	£145,898

As will be seen, the total shows a decline of £35,852, the imports of radio goods being the only item recording an improvement.

F.B.I. President at Manchester

At a luncheon given last week by the Manchester branch of the Federation of British Industries, Sir George Beharrell, president of the Federation, alluded to the efficiency and enthusiasm of trade organisation in Lancashire and outlined the position of the world to-day, pointing out the increasing importance of an authoritative central organisation to voice the views of industry. Of the three pending conferences—Lausanne, Geneva and Ottawa—Sir George pinned the greatest hope on Ottawa, as giving an opportunity for Great Britain in partnership with her Dominions and Colonies to give the lead away from the policy of "economic nationalism," which was strangling the trade of the world to-day. Referring to this country, Sir George defined our problem as being largely one of confidence, and stated that industry could not stand any further taxation. The Budget, he said, must be balanced from the other end, by reduction of governmental and local expenditure, which could only be attained to an extent commensurate with our present necessities by a definite change in governmental policy.

Conditions in Poland

A Department of Overseas Trade report on economic conditions in Poland during 1931 (Stationery Office, 2s.), states that, in common with other countries, the position in finance, industry, commerce, agriculture and transport was unsatisfactory at the close of the year, and that prospects are not very hopeful. The country has, however, given proof of considerable stability and attention has been directed towards raising the purchasing power of the people and increasing exports. No improvement was recorded in 1931 in the electrical engineering industry, the position of which has become difficult. The works belonging to Messrs. Brown, Boveri, situated at Creszyn and Zychlin, have been closed owing to lack of orders, but it is believed that the former will shortly

be reopened. The increase in the Customs duty on a number of articles and the inclusion of others in the list of goods which can now be imported only under licence may lead to a revival of production. Imports of electrical machinery last year amounted to 13,887,000 zloty. During the year the number of broadcast receiving licences rose from 236,000 to 310,214, the increase being due mainly to the installation of large quantities of cheap crystal receivers of Polish manufacture. The financial position of dealers in radio apparatus has deteriorated and great caution is therefore recommended in doing business with them; competition is keen.

Royal Ulster Agricultural Show

The Northern Ireland Area Committee of the British Electrical Development Association held an electrical display at the Royal Ulster Agricultural Society's Annual Show, which took place recently in the Balmoral Showgrounds, Belfast. The show, the actual arrangements for which were made by a committee under the chairmanship of Major R. W. Klitz, sales manager of the Electricity Board for Northern Ireland, was divided into two parts. One, in the open, consisted of farm machines, including pumps, churns, and milk coolers, lent by the local agricultural engineering agents and driven by motors supplied by the Metropolitan-Vickers Electrical Co., Ltd., the English Electric Co., Ltd., and the General Electric Co., Ltd. The other part included a large marquee with a comprehensive display of electrical appliances for the farm and home, continuous demonstrations being given of electric cooking and ironing. The visitors displayed a great deal of interest in the various electric hovers and the electric portable groomer. The general impression seems to be that Northern Ireland is likely to be a good field for the lighter type of electrical farm appliance, but that it will be a year or two before development is sufficiently advanced for the Ulster farmer to be seriously interested in the heavier type of electrical machinery.

An electric clock display at Blackburn

Scottish Ideal Home Exhibition

The second Scottish Ideal Home Exhibition organised by the *Daily Mail* will be held at Kelvin Hall, Glasgow, from October 5th to 29th. Details of space still available are obtainable from the manager, Scottish Ideal Home Exhibition, Carmelite House, E.C.4, or 43, Hope Street, Glasgow.

American Electrical Exports

During March exports of electrical equipment from the United States totalled $4,990,900, against $8,177,415 in March, 1931, while for the first three months of the year the total value declined from $23,097,880 to $13,807,489. There were increases from $12,905 to $373,664 in the exports of a.c. generators and from $49,452 to $106,687 in those of accessories and parts for generators, but under practically every other classification serious declines were recorded. The following are the principal March figures, the exports for the corresponding month of 1931 being given in parentheses:—D.c. generators, $7,034 ($111,731); steam turbine generator sets, $182 ($51,361); batteries, $374,262 ($502,090); transforming and converting apparatus, $259,052 ($334,779); transmission and distribution apparatus, $414,736 ($701,060); motors, $120,362 ($311,105); starting and controlling equipment, $60,419 ($113,492); electric refrigerators and parts, $799,922 ($1,357,249), flashlight cases, $17,071 ($45,907); fans, $24,265 ($44,446); washing machines, $25,491 ($80,319); vacuum cleaners, $34,254 ($99 977); cookers, furnaces, and other heating devices, $51,525 ($154,743); radio apparatus, $1,096,576 ($1,546,635); telegraph apparatus, $13,674 ($39,555); telephone apparatus, $69,643 ($247,346).

Canada, taking goods to the value of $903,035, continues to head the list of purchasing countries. Spain, with $764,472 worth, was the second largest buyer, most of its purchases being in the heavy equipment class, while France ($328,482) was the third. The United Kingdom's share was $207,850.

The imports of electrical equipment during March amounted to $160,463, a decrease of $133,412 as compared with March, 1931.

B.B.C. Developments

We are informed by Messrs. A. P. Lundberg & Sons, Ltd., that they supplied the special multi-way type of plugs and sockets used for the microphone plug points at Broadcasting House, which was described in our issue of May 27th.

At the new B.B.C. station at Falkirk, described in the same issue, "Henley" wires and cables were used for the various circuits.

Price Reductions

The Belgrave Electric Co. announces reduced prices for gas-filled electric lamps, both clear and pearl, from 25 to 100 watts.

Social Event

We are informed that the cricket match which was to take place on July 7th between the Leeds Electrical Club and the Sheffield Electrical Club at Hathersage, will take place on June 16th.

Works Welfare Schemes

The fact that 92 per cent. of the factories in this country employ fewer than a hundred persons renders a new publication of the Industrial Welfare Society entitled "The Introduction of a Works Welfare Scheme" of particularly wide interest. The booklet is designed especially to assist the employers of this large number of smaller factories in the organisation of schemes relating to thrift, health, recreation, education, etc. Such subjects as the holiday fund, the savings club, ambulance equipment, and the cost of the various schemes are dealt with, and all the suggestions made are of the most practical character. Anyone contemplating establishing any kind of welfare scheme would be unwise to proceed before obtaining a copy.

Electric Clocks at Blackburn

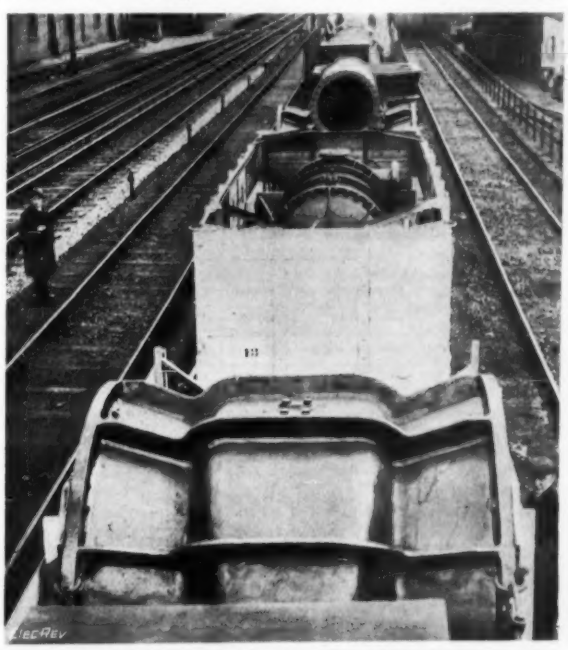
There has been considerable discussion in Lancashire jewellery circles of late, as to whether the sale and adjustment of electric clocks form part of the old skilled craft, or whether it is legitimately part of the work of the electrician. The jewellers agree that the laying of wires to meters is legitimately the work of the electrician, but they contend that the regulation and repair of the clocks is part of their craft. The electrical industry is making a bid for the trade as is shown by our illustration of a display of various makes at the Blackburn Corporation electricity showroom. The Electricity Committee is endeavouring to get a hold in the domestic field, as well as in industrial establishments.

A Japanese Cartel

It is reported that the five leading electrical companies in Japan have formed a cartel agreement concerning the construction of power stations.

British Plant for Copenhagen

On June 5th a special train conveying 340 tons of electrical machinery, comprising two 36,000-kW turbo-alternator sets, destined for the electricity works of the Copenhagen municipality, left the works of Messrs. C. A. Parsons & Co., Ltd., Newcastle. The wagons are to be taken to the Continent by the Harwich-Zeebrugge train ferry and Danish train ferries will take them over. The journey will occupy over a fortnight. A number of men from the Parsons works are travelling with the load and will assemble the machinery upon its arrival in Copenhagen.



A general view of the train which is taking Parsons plant to Copenhagen

The St. Austell Bay Hotel

Referring to the note in our last issue dealing with the electrical installation at this hotel, Messrs. Gent & Co., Ltd., ask us to state that the eighty-two light signals and the "Pulsynetic" clock and dials mentioned were of their manufacture.

Trade Announcements

Callender's Cable & Construction Co., Ltd., has opened a branch office and stores at 17, St. Mary's Street, Swansea, where stocks are kept of all types of rubber insulated cables, flexible cords, &c., including cables and fittings for the Callender "Kaleeco," "Kalibond" and c.t.s. wiring systems; also "Ankaflex." The telephone number is Swansea 3762.

Mrs. Jones announces that she is continuing the business of the Advance Electrical Co. at Monson Road, Tunbridge Wells, which was established in 1916 by her husband, the late Mr. Edmund Ardron Jones.

To meet the new situation brought about by the imposition of tariffs, Messrs. Stewarts & Lloyds, Ltd., and the United Steel Companies, Ltd., have decided upon an extensive scheme of co-operation.

The Telegraph Construction & Maintenance Co., Ltd., has entered into an arrangement with Wild-Barfield Electric Furnaces, Ltd., whereby the latter company will act as sole wholesale distributor of the following resistance alloys:—"Pyromic" 80/20 nickel chromium for temperatures up to 1,150° C., and "Calomic" nickel chromium iron for temperatures up to 1,000° C. A catalogue of these alloys is in course of preparation.

The registered office of the Park Royal Engineering Co., Ltd., is now at Bush House (West Wing), Aldwych, W.C., where all communications should be addressed. For economic reasons the company has transferred its instrument section to the Metropolitan-Vickers Electrical Co., Ltd.

Messrs. Muller & Co. (England), Ltd., have removed to Sphinx Works, Chase Road, Park Royal, N.W. (Telephone: Willesden 7282-3.)

The works and offices of the Cressall Manufacturing Co. will be closed on June 18th for the annual works outing.

Messrs. Palmer, Riley & Co., Ltd., electrical and radio wholesalers, Accrington, have opened a branch at 11, Weymouth Street, Halifax.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, Etc.	Price June 8th.	Fortnight's Inc. or Dec.
a	Acid, Oxalic ... ... per lb.	5½d.	—
a	Ammoniac, Sal ... ... per ton	£60	—
a	Ammonia, Muriate (large crystal) ... ,,	£52	—
a	Borax ... ... ,,	£17	—
a	Copper Sulphate ... ... ,,	£25 10s.	—
a	Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a	,, Perchlorate ... ... ,,	5½d.	—
a	Shellac T.N. ... ... per cwt.	£3 15s.	—
a	Sulphur Commercial ... ... per ton	£11	—
a	,, Roll ... ... ,,	£11	—
a	Soda, Chlorate... ... ... per lb.	3½d. to 3¾d.	—
a	,, Crystals... ... ... per ton	£5 to £5 5s.	—
a	Sodium Bichromate, casks ... ... per lb.	4d.	—
	METALS, Etc		
b	Aluminium, Ingots ... ... per ton	£95 to £100	—
b	,, Wire ... ... per lb.	1/1 to 1/9	—
b	,, Sheet and Foil ... ... ,,	1/1½ to 2/9	—
p	Babbits Metal and Anti-friction Metals—		
	Grade I ... ... per ton net	£113	£6 dec.
	Grade II ... ... ,,	£81	£4 dec.
	Grade III ... ... ,,	£47	£2 dec.
c	Brass (rolled metal 2" to 12" basis)... per lb.	6½d.	—
c	,, Tubes (solid drawn) ... ... ,,	8¼d. to 9d.	—
c	,, Wire, basis ... ... ,,	7¼d.	—
c	Copper Tubes (solid drawn) ... ... ,,	9½d.	—
g	,, Bars best selected) ... ... per ton	£59	
g	,, Sheet ... ... ,,	£59	£2 dec.
g	,, Rod ... ... ,,	£59	
g	,, (Electrolytic) Bars ... ... ,,	£35 10s.	10s. dec.
d	,, ,, Sheets... ... ,,	£63 5s.	5s. dec.
d	,, ,, Wire Rods ... ,,	£39 15s.	5s. dec.
d	,, ,, H.C. Wire ... per lb.	6⅛d.	⅛d. dec.
f	Ebonite Rod ... ... ,,	1/3 to 1/6	—
f	,, Sheet ... ... ,,	1/3 to 1/6	—
m	German Silver Wire ... ... ,,	2/2	—
h	Gutta-percha, fine ... ... ,,	nom.	—
h	India-rubber, Para fine ... ... ,,	3½d.	—
i	Iron, Pig (Cleveland No. 3) ... ... per ton	58/6	—
i	,, Wire, galve. No. 1, P.O. qual. ,,	£20	—
g	Lead, English pig ... ... ,,	£11 15s.	10s. dec.
g	Mercury ... ... per bot.	£14	£2 dec.
e	Mica in original cases) small ... per lb.	6d. to 8/6	—
e	,, ,, medium ... ,,	4/- to 8/-	—
e	,, ,, large ... ,,	8/6 to 17/6 & up	—
p	Phosphor Bronze, plain castings ... ,,	1/1d.	¼d. dec.
p	,, ,, drawn bars & rods ,,	10¾d.	—
p	,, ,, rolled strip & sheet ,,	10¼d.	—
p	,, ,, wire ... ... ,,	11¼d.	—
o	Platinum ... ... per oz.	£9 15s.	—
d	Silicium Bronze Wire... ... ... per lb.	7¾d.	—
r	Steel, magnet, in bars ... ... ,,	7¾d.	—
g	Tin, Block (English) ... ... per ton	£116 15s. to £118 15s.	£8 dec.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	3/1	—

Quotations supplied by:—

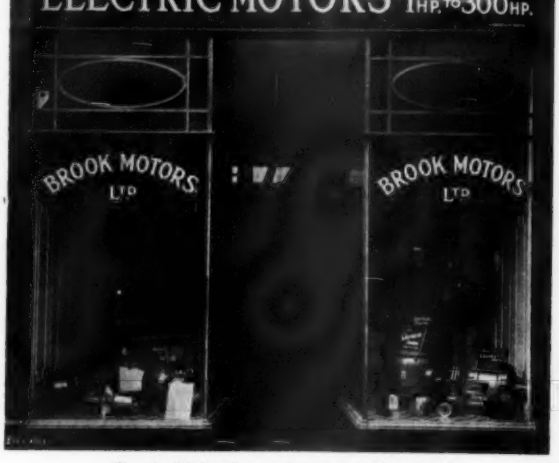
a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Boiling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

The Sussex County Agricultural Show

A feature of the Sussex County Agricultural Show, which will be held at Eastbourne on June 22nd and 23rd, will be an electrical section containing exhibits of apparatus designed for use on farms and in farmhouses. The section has been organised by the Electricity Departments of Eastbourne, Brighton, and Hastings, and the Central Sussex, Lewes and District, Ringmer, and the Weald electricity supply companies. The exhibit will be divided into a number of sections, the centre of the stand displaying household appliances.

Brook Motors' New Showrooms

The accompanying illustration shows the new showrooms which have been opened by Brook Motors, Ltd., at 77, Granby Street, Leicester. Similar premises have already been opened in Newcastle, Leeds and Huddersfield, while further showrooms will be opened shortly in Glasgow, Manchester and Birmingham. The company has found these showrooms to be a great help to their selling organisation and they have met with the approval of electrical contractors who can now take their customers round and show them the actual type of article they are offering.



Brook Motors' new Leicester showrooms

New Catalogues and Lists

Alfa-Laval Co., Ltd., 34, Grosvenor Road, S.W.1.—A catalogue (No. 11,070) of "De Laval" industrial centrifugal separators.

Colville's, Ltd., 195, West George Street, Glasgow.—A booklet relating to the company's iron and steel products.

Multitone Electric Co., Ltd., 95-98, White Lion Street, N.1.—An illustrated brochure on radio tone control.

Wilkins & Mitchell, Darlaston.—Illustrated leaflets describing the "Servis" electric washer.

G. Carr & Son, Ltd., 93 & 95, Rotherhithe Street, S.E.16.—A leaflet giving particulars of chain and lifting gear.

C. W. Outram & Co., Ltd., Woodville, near Burton-on-Trent.—An illustrated leaflet on refractories for electric fires, tubular heaters, cookers, &c.

George Humphrey, 25B, High Street, Wimbledon, S.W.19.—A leaflet dealing with "Komm-Glaze" lubricating compound. Also a circular relating to "Community Service" fuse wire holders.

Elliott Brothers (London), Ltd., Century Works, Lewisham, S.E.13.—Sixteen catalogue sheets relating to instrument transformers (current and voltage).

Crompton Parkinson, Ltd., Bush House, W.C.2.—A leaflet describing a new thermal maximum demand indicator.

British Electric Transformer Co., Ltd., Wellington House, Strand, W.C.2.—A leaflet dealing with the "Tricity" cooker No. 800 with round boiling plates.

Donovan & Co., 46 and 47, Great Charles Street, Birmingham.—Publication No. 3229, illustrating "Solink" links for isolating motors, transformers and control gear.

British Insulated Cables, Ltd., Prescot, Lancs.—A circular relating to "B.I." enamelled wires.

Direct Electric Lamp Co., Ltd., 72, Shoe Lane, E.C.4.—Leaflets describing "Frigid" fans and "Demon" vacuum cleaners.

Fry's (London), Ltd., 24/25, King Street, Minories, E.1.—A leaflet on "Enox" sheet saws.

L. G. Hawkins & Co., Ltd., 30/35, Drury Lane, W.C.2.—Leaflets dealing with switches, plugs, bell pushes, and "Pye" radio receivers; an announcement that "Supreme" bakelite hair-dryers are now entirely British made; and the June issue of "The Link."

Standard Telephones & Cables, Ltd., Connaught House, Aldwych, W.C.2.—A loose-leaf catalogue covering the company's complete range of radio valves.

Harland Engineering Co., Ltd., 72/74, Victoria Street, Westminster, S.W.1.—Leaflets on type "W" oil circuit breakers, kiosk sub-station and current transformers. Also an illustrated catalogue of centrifugal pumps, d.c. and a.c. machinery, and h.p. and l.p. switchgear.

Marconi's Wireless Telegraph Co., Ltd., Marconi House, Strand, W.C.2.—Publication No. 1140, describing two new aircraft direction finding attachments.

Mosses & Mitchell, Ltd., 60, 62 and 64, Ironmonger Row, E.C.1.—A leaflet announcing reduced prices of "Vulmos" vulcanised fibre.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—Particulars of automatic preset controllers for polyphase slip-ring motors (Leaflet No. 1288).

M. & C. Switchgear, Ltd., Kelvinside Works, Kirkintilloch, Glasgow.—Pamphlets Nos. K.61/1 and R41/2 on flameproof air-break switchgear and a.c. motor starters respectively.

Sun Electrical Co., Ltd., 118-120, Charing Cross Road, W.C.2.—An illustrated catalogue of electric fans. A number of improvements are to be observed in the ventilating and exhaust types.

Premier Electric Heaters, Ltd., Keeley Street and St. Andrew's Road, Birmingham.—Folder No. 190, containing a full description of the new No. 905 toaster.

Partridge, Wilson & Co., Davenset Works, Evington Valley Road, Leicester.—A stoutly made showcard bearing the words "Batteries charged here with 'Davenset' apparatus." It will be issued free with all "Davenset" charging equipment, present users being supplied at 1s. each copy.

Bankruptcy Proceedings

G. T. P. Yeoman and **L. T. H. Greig** (trading as Yeoman & Greig), electrical goods agents, 4, North End Road, Golders Green.—These debtors attended on May 31st before Mr. Registrar Mellor at the London Bankruptcy Court for public examination upon joint accounts showing liabilities of £338 and assets variously valued by Yeoman at £321 and by Greig at £583. The failure was attributed to lack of capital and heavy overhead expenses. The examination was concluded.

J. J. Wilson, electrical, wireless and music dealer, 9, Churchyard, Hitchin, Herts.—The public examination was held recently at the Court House, Luton; a statement of affairs had been filed which disclosed ranking liabilities of £499 and net assets of £239, leaving a deficiency of £260. Debtor attributed his failure to lack of capital and bad debts. The examination was adjourned.

G. W. Lambert, electrician, 3, Ontario Street, Southwark, S.E.—Receiving order made May 27th on debtor's own petition. Public examination August 23rd, at Bankruptcy Buildings, Carey Street, W.C.

W. Smith (W. Smith & Co.), electrical engineer, 12, Haden Road, Old Hill, Staffs.—Public examination June 29th, at the Court House, Priory Street, Dudley.

E. A. Blest, radio dealer, 71A, Halesowen Road, Old Hill, Staffs.—Last day for receiving proofs for dividend June 15th. Trustee, Mr. A. M. Fairbairn, 1, Priory Street, Dudley, Official Receiver.

A. J. Brookes, electrical contractor, 36, North End Road, Golders Green, London, N.W.—The first meeting of creditors was held on June 2nd at the Bankruptcy Buildings, Carey Street. The debtor estimates his liabilities at £1,200 and his assets, which consist of book debts, at £200. The stock was covered by a distraint levied by his landlord. As a result of the meeting, which was closed, the debtor's estate remained in the hands of the Official Receiver.

T. Hardy, dealer in electrical goods, 46, Turrett Road, Wallasey.—Receiving order made May 30th on a creditor's petition. First meeting to-day (Friday) at the offices of the Official Receiver, Government Buildings, Victoria Street, Liverpool. Public examination July 20th at the Court House, Pilgrim Street, Birkenhead.

G. Shilrock (G. Shilrock & Son), electrical contractor, 197, Railway Terrace, Rugby.—Receiving order made May 31st, on debtor's own petition.

W. F. O. Sewell (Commercial Electrical Co.), electrical engineer, 24, James Street, Bradford.—Trustee, Mr. J. O. Morris, 12, Duke Street, Bradford, Official Receiver, released May 25th.

V. Shewan & A. L. Grace (Avon Radio Manufacturing Co.), wireless manufacturers, Long Ashton.—Trustee, Mr. J. D. Turner, 26, Baldwin Street, Bristol, Official Receiver, released May 20th.

Company Liquidations

C. C. Newling & Co., Ltd., interior lighting and decorating specialists, 5a, Princes Street, Hanover Square, W.1.—A meeting of creditors was held recently at the offices of Messrs. Toy, Campbell & Co., 16 and 17, South Street, E.C.2, when a statement of affairs was submitted which disclosed liabilities of £1,756, of which £811 was due to trade and sundry creditors, and there were loan creditors for £945. In addition there was a fully secured creditor for £940, holding security valued at £1,003. The total assets amounted to £1,080, or a deficiency of £677. It was resolved to confirm the voluntary liquidation of the company with Mr. Piggott, 16/17, South Street, E.C., as liquidator, and a committee of inspection consisting of three of the creditors.

Wynsor Electric Range Co., Ltd.—Mr. W. H. Stentiford, liquidator, 1, Broad Street Place, E.C., released April 25th.

Central Electrical Co. (Nottingham), Ltd.—Winding up voluntarily. Liquidator, Mr. J. Stephenson, Queen Street Chambers, Peterborough.

Arthur Burgess & Son (Lutterworth), Ltd.—Meetings, July 5th, at 3, Warwick Passage, Corporation Street, Birmingham, to receive an account of the winding up by the liquidator, Mr. F. E. Bendall.

Winding-up Petitions

Selectors (1931), Ltd.—In the Companies Court on Monday Mr. Justice Eve had before him a petition to wind up this company. The petitioning creditor's debt was £36 for goods sold, the petitioners being the General Electric Co., Ltd. The petition was supported by another creditor for £81. No notice of opposition had been received from the company. Counsel for the petitioner asked for an order for the compulsory winding up of the company. His Lordship said the petitioners were entitled to their order. He noticed there was a creditor for £600. A compulsory order for winding up was made.

Baxter & Caunter, Ltd.—Mr. A. A. Lough, receiver and manager, has prepared a statement of this company's affairs which shows total liabilities of £18,317 to unsecured creditors with a deficiency of £14,591. The position is attributed to the fall in turnover with no corresponding reduction in overhead expenses and to the loss of an important agency. A meeting of unsecured creditors is called for June 20th at Winchester House, Old Broad Street, E.C.2, to consider a scheme of arrangement under which they are offered a composition of 7s. in the £.

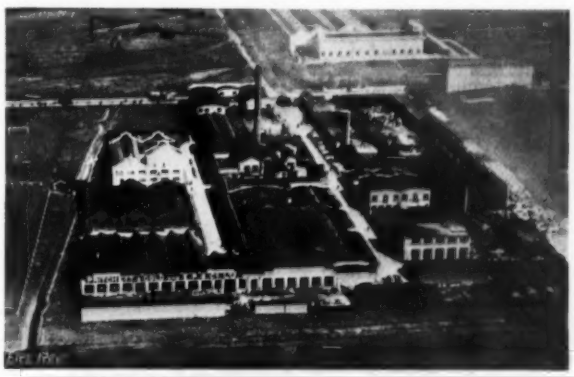
Electricity Supply

Lighting, Domestic, Power

Barnstaple.—LOANS.—The Town Council has received sanction to loans of £9,451 for two Diesel engines; £650 for overhead mains for the Yeo Vale supply; £3,500 for mains, services and meters; £1,500 for the Coney feeder; and £2,000 for prospective capital expenditure. Application has also been made for a further loan of £2,172 for engine foundations, balancer and switchgear, connecting cables for generators, temperature indicators, and engineering fees, in connection with the extensions.

YEAR'S WORKING.—The annual report on the Corporation electricity undertaking shows a net profit for the year of £4,982. Mr. George Garnish, the chairman of the Lighting Committee, stated last week that the figures proved beyond doubt that the substitution of oil for coal for generation was an unqualified success.

Brighouse.—LIGHTING REDUCTIONS.—The Town Council has reduced the charge for electricity for lighting from 4½d. to 4d. per kWh.



An aerial view of the Dagenham Dock Works of Messrs. Pritchett & Gold and E.P.S. Co., Ltd.

Burnham (Bucks).—EXTENSIONS.—The Parish Council has received the consent of the County Council to raise a loan of £500 for extending the lighting area, and lighting the entire parish by electricity instead of gas.

Burnley.—ALTERATION OF RATEABLE VALUE TARIFF.—It is proposed to introduce a new scale of electricity charges on the rateable value system. On the first £15 of rateable value there is to be a charge of 20 per cent. per annum, with a minimum charge of £2; on the next £15, 15 per cent.; on the next £20, 10 per cent.; and on the next £30, 7½ per cent. On rateable value above £80 a charge of 5 per cent. is suggested. The "unit" charge will be ½d.

LOAN.—The Electricity Committee is to apply for sanction to a loan of £25,000 for expenditure on mains extensions and services until March 31st, 1934.

Bury.—YEAR'S WORKING.—The Electricity Department last year made a net profit of £7,524.

Canada.—THE ST. LAWRENCE SCHEME.—An agreement between Canada and the United States regarding the scheme for deepening the St. Lawrence waterway and developing hydro-electric power will probably be reached, according to an unofficial announcement, before the end of this month. It is understood that the major engineering and financial problems have been settled, and that both Governments are ready to proceed with the conclusion of power and navigation projects, culminating in a waterway 27 feet deep to the head of the Great Lakes.—*Reuter* (Ottawa).

LARGE EXTENSION SCHEME.—The Montreal Light, Heat and Power Consolidated is preparing to carry out an important extension programme during the coming season. Additions are to be made to transmission lines, sub-stations and distribution equipment, involving an expenditure of approximately $850,000.

Carlisle.—YEAR'S WORKING.—Last year the Electricity Department made a profit of about £7,000, while in the previous year a deficiency of £7,325 was recorded.

Chester.—ELECTRICITY COMMITTEE'S TOUR.—To demonstrate the enormous strides made in the development of the rural load, members of the Electricity Committee were recently taken for a hundred-mile tour of the Corporation's supply area. Besides visiting some of the 300 farms which now use electricity for lighting and power, the Committee inspected the Upton Mill bakery, the Great Barrow flour mills, the Barrowmore Hall settlement, the artesian well at Ashton Hayes, the Ship Canal Sand Co.'s quarry at Mouldsworth, and Messrs. Brooks' garage at Pulford.

Clitheroe.—SPECIAL ORDER.—The Corporation is applying to the Electricity Commissioners for a Special Order providing for the extension of its electricity supply area so as to include the townships of Aighton and Bailey, Chaigley, Thornley-with-Wheatley, Chipping, Seagram, Little Bowland and Mitton; parts of Henthorn, Coldcoats and Tosside, and part of the Bowland rural district.

Colchester.—LOAN.—The Electricity Committee is to apply for sanction to a loan of £11,468 in connection with the construction of the East Bergholt-Brantham and Ramsey-Bradfield transmission lines.

YEAR'S WORKING.—The annual report on the operation of the electricity undertaking for the year ended March 31st, 1932, shows a net surplus of £5,500. The income totalled £107,167.

Continental.—RUSSIA.—A group of experts have left Leningrad for the Urals-Kuznetsk Basin district to make a study of the possibilities of hydro-electric development on the Katuni river. The investigations are being carried out on behalf of a hydro-electric power development trust, and it is estimated that the Katuni river has a potential power of eight million kW.

GERMANY.—The production of electricity by the 122 principal power stations during the first three months of this year was 3,276.6 million kWh, as compared with 3,833 million kWh for the corresponding period of 1931.

Dumfriesshire.—PROGRESS OF ELECTRICITY SCHEME.—The construction work of the County Council's electricity scheme is now well advanced, lines having been completed between Dumfries and Gretna; Dumfries, Moniaive and Kirkconnel; Gretna and Langholm; and Lockerbie and Moffat. The canvass for consumers so far has been very satisfactory and that in the burghs of Annan, Lockerbie, Moffat, Langholm, Lochmaben and Sanquhar will now be proceeded with. The Electricity Committee, of which Major J. G. Crabbe, of Duncow, is chairman, is satisfied with the amount of public interest which has been shown in the scheme throughout the county. A demonstration van equipped to illustrate the advantages and convenience of the use of electricity is proving very useful.

Earby.—REDUCED CHARGES.—The Urban District Council has reduced its charges for electricity for churches, schools, shops, halls, &c., from 6d. to 5½d. per kWh for the first 100 kWh, energy above that amount being supplied at the rate of 5d. per kWh. Ninety-four per cent. of the domestic consumers are now supplied under the rateable-value tariff.

Exeter.—SPECIAL ORDER.—The Corporation is applying to the Electricity Commissioners for a Special Order extending its area of supply so as to include the parishes of Exminster, Kenn, Shillingford Saint George and Dunchideock.

Guildford.—SUPPLY TO HOUSING ESTATE.—The Electricity Committee is considering an application by Mr. Beagley, of Shalford, for a supply of electricity to a new estate being developed in Littleford Lane. It will be necessary to make a long extension of mains and to erect a transformer kiosk at a cost of £1,475.

ELECTRIC COPPERS FOR COUNCIL HOUSES.—Arrangements have been made for the installation of electric coppers in Council houses.

Hayle (Cornwall).—CHANGE-OVER.—Extensions to the Cornwall Electric Power Co.'s undertaking are now in course of construction. It is understood that the first section, which includes a part of Hayle, is to be changed from 25 to 50 cycles in the near future.

Houghton-le-Spring.—LIGHTING CONTRACT.—The Houghton-le-Spring and District Electric Lighting Co., Ltd., has received the contract for the installation of electric lighting in a hundred houses for the Hetton-le-Hole Urban District Council.

Hull.—INCREASING THE BOILER OUTPUT.—At a recent meeting of the Electricity Committee the electrical engineer reported that boilers supplied recently had passed the official acceptance tests, and it had occurred to him that it would be a comparatively simple job to increase their output by 20 per cent. He had gone into this question very carefully with the main contractors, a scheme had been prepared, and the necessary guarantees obtained for certain modifications, including the provision of water-cooled walls to the furnaces, the total cost of which would not exceed £3,900 per boiler. The Committee decided that the additions should be made and that work on one boiler should be proceeded with immediately, the remaining four to be done after extended tests.

Ilford.—WIRING INSTALLATIONS.—The Electricity Committee has obtained sanction to a loan of £5,000 for house wiring installations.

Kettering.—ASSISTED WIRING AND HIRE-PURCHASE SCHEMES.—The Electricity Committee proposes to undertake wiring on the deferred payment system and to let out apparatus on the hire and hire-purchase systems

OVERHEAD LINES.—Sanction has been obtained to the erection of overhead lines in the parish of Barton Seagrave.

Kingston-on-Thames.—MAINS EXTENSIONS.—The Town Council is applying for sanction to a loan of £10,533 for the installation of new h.p. and l.p. mains in various parts of the borough, with the necessary sub-station equipment and switchgear.

Lancaster.—CANVASS OF GALGATE.—A canvass of the residents in Galgate is being taken with a view to ascertaining the demand for electricity in the village.

Leeds.—LIGHTING CHARGES FOR LARGE CONSUMERS.—The following alternative lighting charge for large consumers is proposed by the Electricity Committee: A fixed charge of £10 per annum per kW of maximum demand, plus 0.5d. per kWh consumed up to 100,000 kWh, 0.475d. for next 50,000 kWh, 0.45d. for next 50,000 kWh, 0.425d. for next 50,000 kWh, and 0.4d. for all energy above 250,000 kWh. Consumers are to have the option of bulking all requirements, whether for lighting, heating, or power, for the purpose of the application of this tariff.

London.—FULHAM.—The Electricity Department is to spend £775 on mains extensions in Buckler's Place, Hugon Road, Goodson Road, Harwood Terrace, Langford Road, and Parkville Road.

Longridge (Lancs).—SUPPLY INAUGURATED.—On June 2nd the new electricity supply was inaugurated by Mrs. H. E. Rhodes, wife of the chairman of Preston Electricity Committee.

Manchester.—PROGRESS DURING APRIL.—During April the Electricity Department recorded an increase of 4,103 kW in connections, bringing the total to 500,119 kW. Applications for supplies (including additional supplies) amounted to 1,930, representing a total of 4,889 kW. There were 256 new cookers connected, making the total on circuit 9,596, while orders received for the hire of cookers amounted to 309. A new sub-station was put into commission in Upper Brook Street, and new plant was installed at five existing sub-stations.

Mansfield.—NEW FEEDER.—The Electricity Committee has obtained sanction to a loan of £5,450 for a supplementary feeder main between Burns Street and Cock Lane.

Merthyr Tydfil.—SUPPLY TO COUNCIL HOUSES.—The Town Council has granted a request by the Merthyr Electric Traction and Lighting Co., Ltd., to supply Council houses in various parts of the borough.

Plymouth.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking for the past year show a net surplus of £20,637.

Preston.—ANNUAL INSPECTION OF ELECTRICITY WORKS.—At the annual inspection of the Ribble Electricity Works on June 2nd, Councillor E. Rhodes (chairman) said that last year Preston generated 100,000,000 kWh. Since then, despite bad trade, they had generated an extra 10,000,000 kWh at a total cost of £2,861 less than 1931. They had a balance in 1930-31 of £17,000. During last year they reduced tariffs at a cost of between £3,000 and £4,000 in the March quarter, but the income of £303,000 had been increased by £24,000. Generating and other charges had risen from £144,000 to £148,000, and there had been a gross surplus of £159,000. They had carried out 713 installations and the number of consumers connected (3,289) was a record. Twenty-seven miles of extra cabling had been laid, making a total of 401 miles, excluding the Blackburn and Blackpool line. Over 1,000 new cookers had been connected, making a total of 5,500; during April the addition of 229 cookers was a record. The development in wash-boilers was proceeding, and fifty new poultry farms had been connected up, the total now being 126.

Ripon.—A SCHEME FOR MARKINGTON.—The Electricity Committee has instructed the consulting engineer to prepare a scheme for supplying Markington.

PREPAYMENT METER CHARGES.—The minimum charges now in force for ordinary meters are in future to apply to prepayment meters also.

Rochdale.—YEAR'S WORKING.—For the past year the accounts of the Electricity Department show a profit of £8,488, of which £5,000 has been placed to reserve. Reductions in charges for electricity are to be made representing a saving to consumers of over £6,000.

Southend-on-Sea.—REDUCTION OF "ALL-IN" TARIFF.—The Town Council has reduced the fixed charge of the "all-in" domestic rate from 12½ to 10 per cent., with a "unit" charge of 1d. in the winter and ½d. in the summer.

Sunderland.—CHANGE-OVER COMPLETED.—The scheme embarked upon by the Electricity Committee in 1929 for alterations and improvements to the electricity undertaking (changing from d.c. to a.c. and building necessary sub-stations) has now been completed. The actual cost was £110,574, or £23,000 less than the estimated cost.

Swansea.—DEPUTATION TO INSPECT LEEDS STATION.—In order to obtain information helpful in connection with the erection of the new Tir John power station, the Electricity Committee is to send a deputation consisting of the chairman, vice-chairman, a councillor, and the borough electrical engineer to inspect the power station at Leeds.

Teignmouth.—BULK SUPPLY.—The Teignmouth Electric Lighting Co., Ltd., is arranging to provide a bulk supply to the Chudleigh Electric Light & Power Co., Ltd.

Torquay.—MAINS EXTENSIONS.—The Electricity Committee is applying for sanction to a loan of £20,000 for mains extensions.

Wallingford.—PUBLIC LIGHTING.—The Rural District Council has entered into an agreement with the Wessex Electricity Co. for public lighting at East Hagbourne.

Winchester.—MODERNISING THE CATHEDRAL.—A sum of £20,000 has been appealed for by the Dean and Chapter for modernising the Cathedral's heating and lighting systems, &c.

Withernsea.—PROPOSED ILLUMINATIONS.—The Urban District Council has under consideration a scheme for an illumination week for the town.

York.—LOANS.—The Electricity Committee is to apply for sanction to loans of £10,000 for wiring installations, and £8,000 for domestic apparatus for hire.

Traction

Blackburn.—ARE TRAMWAYS OF ANY VALUE?—The question of the value of the tramways arose at a meeting of the Town Council last week, when Alderman Burke reported that the whole of the capital debt, £383,000, had been repaid and the Department had made contributions to rates amounting to £80,000 with £12,980 spent for covering in tramcars. Councillor J. Grimshaw said the Tramway Department had a monopoly and it was unfair to compare it with a private undertaking. Alderman Burke said that they could sell the Department to private enterprise for £500,000. Councillor Culshaw asserted, however, that they would not get even £125,000 for it.

YEAR'S WORKING.—The net profit of the Tramways Department last year was £13,691, of which £8,000 was transferred to the relief of the rates. Traffic receipts showed a decline of £3,932, and there is now a total deficiency of £2,709. Capital expenditure during the year amounted to £21,290, the total capital expenditure to date being £83,235.

Gloucester.—FURTHER TRAMWAY ABANDONMENT.—The Transport Committee recommends the substitution of buses on the remaining tram route from Bristol Road to Hucclecote.

Leeds.—BUSES REPLACE TRAMS.—Buses were substituted for trams last week on the Yorkshire (West Riding) Electric Tramways Co.'s Leeds-Wakefield-Sandal tram route.

Liverpool.—TRANSPORT PROPOSALS.—In a report prepared by the Transport (Special) Committee a number of proposals are made regarding the future of the city's transport system. It is recommended that the tramway services should be continued but that the mileage of non-paying, non-competitive bus services should be reduced; also that the reconditioning of old trams should be discontinued and new vehicles purchased in their place.

London.—NEW ROLLING STOCK FOR THE G.P.O. RAILWAY.—Four years ago the General Post Office opened in London between Paddington and Whitechapel a novel underground railway—the first of its kind in the world—for the purpose of speeding up its mail service in Central London. After exhaustive experiments with various designs of cars (which are driverless and controlled from switch cabins) a new type has been evolved and has now entirely replaced the original vehicles. The new cars have twice the capacity of the older type, so that fifty can do the work of the ninety old ones. Trains usually consist of one or two cars, and between stations attain a speed of 35 m.p.h. Each car is of the bogie type and has an overall length of 27 ft. The centre body is designed to carry four mail-bag containers and is supported by a bogie at each end. The bogies have a wheelbase of 4 ft., and the wheels are 2 ft. and 1 ft. in diameter. The larger wheels are driven by 22-h.p. English Electric motors in series. The brakes are applied by powerful springs and are pulled off by electro-magnets when current is applied to the train. D.c. at 440 V is employed. In a single day the railway carries 29,000 mail bags and relieves street congestion to the extent of 1,500 van miles. Illustrations of the new cars appear on page 863.

Manchester.—BUSES REPLACE TRAMS.—A service of buses was substituted for trams on the Fairfield-Guide Bridge service last Sunday.

Newcastle-upon-Tyne.—COMPROMISE IN PROTECTION DISPUTE.—A compromise has been reached between the Corporation, the Gosforth Urban District Council, and a number of bus proprietors with regard to the protection granted to the municipal tramway undertaking.

Plymouth.—YEAR'S WORKING.—The accounts of the Corporation tramways and buses for the past year show a net surplus of £2,628.

South Shields.—TRAMWAY EXTENSION PROPOSALS.—The Town Council has rejected a proposal of the Tramways Committee to lay a track along Imeary Street, which would shorten by 100 yards the route to Cleadon, and has also referred back for further consideration a scheme to extend the Cleadon system. The estimated cost of the two schemes was £7,300.

Communications

Canada.—NEW RADIO LAW.—The Bill for the nationalisation of radio broadcasting, having passed both Houses of the Dominion Parliament, received the assent of the Acting Governor-General on May 26th and is now law. It authorises the appointment of a Commission of three members, the chairman to receive a salary of $10,000 and the others $8,000 each; nine assistant commissioners will represent the different provinces. The Commission will be given full control of the broadcasting system with powers of expropriation when considered desirable. The change is generally approved by the public.

Germany.—THE TELEPHONE SERVICE TO TURKEY.—After April 21st telephone communication between Germany and Turkey was transferred to the Central European system, *via* Bucharest and Sofia.

Great Britain.—G.P.O.'s 1,000TH AUTO EXCHANGE.—By the cut-over on June 2nd of the equipment at Byron Exchange, Harrow, manufactured and installed by Standard Telephones and Cables, Ltd., the Post Office brought into service its 1,000th automatic exchange. The initial equipment caters for 2,000 subscribers, and the exchange is capable of extension to 10,000 lines. The G.P.O. standard open-type racks, which were used for the first time by the same company in Acorn Exchange, were again employed, and the "piece-meal" method of installation and assembly has again proved its worth.

RADIO EXCHANGES.—Wimbledon Town Council has decided to negotiate for the establishment of a radio relay service for the borough.

Wireless Service, Ltd., London, has commenced a service in Torry, Aberdeen. The Town Planning Committee of Aberdeen Town Council has recommended that no further applications should be granted until inquiry has been made regarding procedure in Edinburgh, Glasgow, and Dundee.

Isle of Thanet Rural District Council has received two applications for permission to establish services at Westgate-on-Sea, and has referred them to the Kent County Council and the local Parochial Committee for consideration.

Bridlington Town Council is to enter into an agreement with Rediffusion, Ltd.

Beckenham Urban Council has refused consent to the installation of a system.

Holland.—TELEGRAMS FROM THE AIR.—Passengers in aeroplanes of the Amsterdam-Paris service are now able to send telegrams while in flight. The telegrams are handed to the aeroplane's wireless operator and sent by him to the nearest ground station. From there the messages are wired to their destination.—*Reuter* (Amsterdam).

Italy.—ROME-SARDINIA CABLE.—A new submarine telephone cable is being laid from Rome to Sardinia.

The Marconi short wave radio set fitted in the Cierva autogiro used for controlling traffic on Derby Day. The receiver is to be seen above the transmitter, on the right being the winch and fairlead for the trailing aerial

Norway.—STATE CONTROLLED BROADCASTING.—Hitherto the country's broadcasting stations have been carried on by several joint stock companies, of which the most important is the Broadcasting Company of Oslo. The Government has now submitted a Bill to the Storting under the provisions of which broadcasting will be reorganised as a Government service from July 1st, 1933. The Government will receive 200,000 kroner (£10,000) from the service, any surplus being utilised for the extension and improvement of the system. The Ministry of Education and Ecclesiastical Affairs will exercise control over the programmes through an institution which will be specially established for the purpose. This controlling body will, however, exercise considerable independence in its functioning. There are at present about 110,000 registered listeners in Norway.—*Reuter* (Oslo).

Spain.—WORLD CONFERENCE.—The World Telephone and Telegraph Conference will be held this year in Madrid, commencing on September 2nd.

Tripoli.—AUTOMATIC TELEPHONY.—Work is in hand on the erection and equipment of an automatic telephone exchange in Tripoli. The installation, which is being carried out by the Ericsson Co., will at first comprise connections for 800 subscribers, with provision for future extension to 9,999. A sub-exchange with eighty connections is also being established in the town.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—SYDNEY.—June 20th. Department of Public Works. Electrically driven pumping plant for Newcastle sewerage works. (G.X. 11522.)*

October 17th. City Council. Four three-circuit power transformers for Pyrmont power station. Construction engineer, Electricity Department (deposit £1 plus sales tax).

Cleethorpes.—June 11th. Urban District Council. Automatic traffic control signals at two crossings. Engineer and surveyor, Council Offices.

Dundee.—June 15th. Electricity Department. Construction of wood cover for screening chambers at No. 3 pumping station, Carolina Port. Mr. D. H. Bishop, general manager and engineer.

East Lothian.—June 13th. County Council. Electric lighting work in 116 houses. County architect, Property and Works Department, Haddington.

Edinburgh.—June 16th. Corporation. Installation of electric lighting at James Gillespie's Boys' School, St. Anne's School (old building), and North Canongate School (new building). City architect.

Egypt.—CAIRO.—June 25th. State Domains Administration. Wire for use with power presses. (G.X. 11535.)*

Glasgow.—June 24th. Corporation. Water-tube boiler mountings, mechanical stokers, grit arrester and economiser for new baths and washhouse. Office of Public Works, City Chambers (fee £2 2s.).

June 14th. Electric lighting installation at Carntyne South Housing Scheme and Hostel. General manager, Electricity Department, 75, Waterloo Street.

Halifax.—June 18th. Corporation. Electricians' work at Children's Home, Westfield. Mr. D. T. Lloyd Jones, borough engineer, Crossley Street.

June 20th. Electricians' work at ten small bungalows, Sandhall Green. Mr. D. T. Lloyd Jones (deposit £1 1s.).

Horsham.—June 27th. Electricity Department. Construction and erection of e.h.p. overhead lines. (June 3rd.)

Hull.—June 21st. Electricity Department. Electrically driven capstan. Mr. J. N. Waite, city electrical engineer and manager, Electricity Works, Sculcoates Lane, Hull.

India.—June 17th. South Indian Railway Co., Ltd. (*a*) Cross arms, insulators, and accessories for overhead distribution lines, and (*b*) street lighting fittings and brackets. Company's Offices, 91, Petty France, S.W.1 (fee 5s.).

Irish Free State.—(DINGLE, CO. KERRY).—June 16th. Harbour Commissioners. Installation of electric lighting on Dingle Pier. Mr. M. Lang, secretary to the Harbour Commissioners, Harbour Office, Dingle.

Lanark.—June 14th. County Council. Various work (including electrical) at 140 houses. Mr. P. C. Smith, county housing and town planning engineer, Hamilton.

Langho (NEAR BLACKBURN).—Lancashire Mental Deficiency Acts Committee. Electric lighting installation at Brockhall Institution extensions. Clerk and steward, Calderstones, Whalley (deposit £3 3s.).

London.—METROPOLITAN WATER BOARD.—June 17th. Stores, including electric lamps. Chief engineer, 173, Rosebery Avenue, E.C.1.

Manchester.—June 20th. Electricity Department. One 6,000-kVA static transformer. (June 3rd.)

June 27th. Automatic, booster transformer, voltage-variation equipments for 6,600-V transformers. (See this issue.)

Menston.—June 20th. West Riding Mental Hospitals Board. Electric lighting installation in part of the Menston Mental Hospital. Mr. W. E. H. Burton, architect and engineer to the Board, Wakefield (deposit £1).

Mexborough.—June 13th. West Riding Education Committee. Electric lighting at new junior school. Education officer, County Hall, Wakefield.

Morley.—June 25th. Education Committee. Electric motors, &c., for new textile department at Technical Institute. Mr. H. Bolan, secretary for technical education, Town Hall.

New Zealand.—WELLINGTON.—July 27th. Post and Telegraph Department. Battery plates. (A.X. 11355.)*

Nottingham.—June 21st. Electricity Department. General stores. (June 3rd.)

Oswestry.—June 20th. Electricity Department. Electrical stores, cables, meters, oils, washed slack, engine room stores, &c. (See this issue.)

Portsmouth.—June 18th. Electricity Department. Switchgear and kiosk sub-stations. (See this issue.)

Smethwick.—Corporation. Electric lighting at Bearwood Baths. Town clerk (deposit £5 5s.).

Swinton and Pendlebury.—Urban District Council. Showcards and advertising matter. (June 3rd.)

Uruguay.—MONTEVIDEO.—July 25th. State Electricity Supply and Telephone Administration. Ten transformer sub-station switchgear equipments.—(A.X. 11359.)*

West Midlands.—June 15th. Joint Electricity Authority. 11-kV overhead lines. (June 3rd.)

West Riding.—June 13th. Education Committee. Installation of electric lighting at Great and Little Preston New Junior School, and Ashwood Road (Rawmarsh) Council School. Education officer, County Hall, Wakefield.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Birkenhead.—Electricity Committee. Accepted. Cable (£479). —Hackbridge Cable Co., Ltd. Transformers (£269).—Metropolitan-Vickers Electrical Co., Ltd. Switchgear (£624).—Switchgear & Cowans, Ltd. Isolating switches (£44).—Electric Control, Ltd.

Education Committee. Accepted. Electric lighting at Hemingford school extension (£161).—A. E. Chesters.

Blackpool.—Transport Committee. Accepted. Five miles of trolley wire.—Whitecross Co., Ltd.

Bolton.—Education Committee. Accepted. Electric lighting installation at Morris Green school.—Holland & Pendlebury.

Dewsbury.—Electricity Committee. Accepted. Feeder pillar (£72).—W. T. Henley's Telegraph Works Co., Ltd.

Hastings.—Electricity Committee. Recommended. Modification of switchgear at power station and 40 sub-stations (approximately £15,000).—Ferguson, Pailin, Ltd.

Leeds.—Electricity Committee. Accepted. Cables.—W. T. Henley's Telegraph Works Co., Ltd. (£267); Enfield Cable Works, Ltd. (£109); Macintosh Cable Co., Ltd. (394); Edison Swan Cables, Ltd. (£493); Hackbridge Cable Co., Ltd. (£664).

Tramways Committee. Accepted. Special trackwork.—Edgar Allen & Co., Ltd. (£130); Hadfields, Ltd. (£2,866).

Manchester.—Electricity Committee. Accepted. Supply of motors for 12 months to June, 1933.—Metropolitan-Vickers Electrical Co., Ltd. (single-phase motors); Laurence, Scott and Electromotors, Ltd. (3-phase motors).

Rotherham.—Rural District Council. Accepted. Wiring thirty houses for electric lighting (£87).—F. L. Smith.

South Shields.—Housing Committee. Accepted. Electrical installation at houses in Farmham Road (£792) and Egerton Road (£417).—E. P. Sturgeon.

Transport Committee. Accepted. Two pairs of points (£90). —Edgar Allen & Co., Ltd. Two tramcar controllers (£132).—English Electric Co., Ltd.

Swindon.—Electricity Committee. Accepted. Cable (£1,166). —Standard Telephones & Cables, Ltd.

Torquay.—Baths Committee. Accepted. Renewal of the electrical installation at medical and swimming baths (£475). —J. Graham.

Forthcoming Events

Incorporated Municipal Electrical Association.—June 15th-18th. Cardiff. Annual convention.

Illuminating Engineering Society.—Friday, June 17th. Royal Society of Arts, London. 7 p.m. Annual general meeting. Presidential address. Sir Francis Goodenough.

Association of Mining Electrical Engineers.—June 20th-24th. Glasgow. Annual convention.

Municipal Tramways and Transport Association, Inc.—June 22nd-24th. Grand Hotel, Eastbourne. Annual conference.

Electrical Contractors' Association.—June 28th-30th. Southport. Annual conference.

Overhead Lines Association.—July 1st. Chesham. Summer meeting.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

IMPERIAL electric fire.
Electric humane killer.
Electric lemon squeezer.

Electric Boilers in Canada

In an article which appeared recently in the *Canadian Engineer* a list was given of the electric boilers now in use in Canada which shows the large extent to which they have been installed. The following particulars are given:—

Province.	No. of Boilers	Total capacity kW.
Quebec	58	808,150
Ontario	24	174,450
Manitoba	33	64,600
British Columbia	7	20,570
Elsewhere	4	38,000
Total	126	1,105,770

About 90 per cent. of the total installed capacity is in paper mills which use immense quantities of steam. It will be seen that the *average* capacity of the boilers in Quebec is about 14,000 kW, and doubtless there are individual boilers of considerably larger capacity than this.

The boilers are operated on off-peak hydro-electric power. Low capital cost, cleanliness, small space occupied, no coal storage or ash disposal and instantaneous starting and stopping are advantages of this method of raising steam, which has been adopted in Canada on a larger scale than in any other country.

Notes

I.E.E. Conversazione

The annual Conversazione of the Institution of Electrical Engineers will be held on June 30th at the Natural History Museum, Cromwell Road, S.W., from 8.30 to 11 p.m. Mr. J. M. Donaldson, the president, and his goddaughter, Miss M. I. Feist, will receive the guests from 8.30 to 9.30 p.m.

Institute of Transport at Buxton

Little reference was made at the Institute of Transport Congress last week, at Buxton, to the subject of electricity as a means of locomotion. Prof. R. V. Wheeler (Professor of Fuel Technology, University of Sheffield), however, in his excellent paper on the "Fuel Research in Relation to Transport," said that the low thermal efficiency of the steam locomotive had prompted critics to suggest that it should be replaced either by electric motors, receiving current from the Central Electricity Board's generating stations through a slipper bar from a live rail, or by a Diesel-electric system. Either of these changes would involve a high capital cost, and this was sufficient to render their widespread adoption impracticable at present, but experience was being gained in the electrification of suburban lines, and Diesel-electric trains were being tested.

South Midland Students' Outing

The annual summer outing of the South Midland Students' Section of the Institution of Electrical Engineers took the form of a visit to the new power station of the West Midlands Joint Electricity Authority at Ironbridge on Saturday last. There was an attendance of ninety-five members and their friends from Birmingham, Wolverhampton, Stourport, Coventry, and Rugby. The party was conducted over the station, which is now nearing completion, by Mr. James Morton, the station engineer, who also entertained them at tea with Mrs. Morton as hostess.

I.E.E. Golf Meeting

No fewer than ten mementos will be competed for at the I.E.E. golf meeting which will be held at Moor Park on June 30th. The meeting is sanctioned by the Council of the I.E.E., and members of all grades are eligible. Intending competitors should send their names in without delay to the hon. secretary, Mr. P. Rosling, c/o Institution of Electrical Engineers, Savoy Place, W.C.2. Some of the mementos are for a single round, to meet the needs of competitors who can spare only half a day.

Combined Electricity and Steam Supply Station

An interesting station has recently been completed in Brunn, Czecho-Slovakia, by the Skoda Works Co. for the Western Moravia Electricity Works Co., the plant being adapted to supply steam as well as electrical energy to the various textile mills in the district. Steam is generated at a pressure of about 938 lb. per sq. in. in a battery of boilers capable of producing 200 tons of steam per hour. The generating plant comprises two 4,500-kW, 6,300-V turbo-generators and one 9,000-h.p. set. The exhaust steam at about 128 lb. pressure is diverted into long-distance distribution pipes and a 6,000-kW low-pressure turbo-generator set has also been installed to utilise any excess of steam not required for industrial purposes. Conversely, live steam can be passed to the distribution pipes through pressure reducing valves when the industrial demand increases at times when the call for electric power is low.

Spondon Power Station

In the article under the above heading in our issue of May 13th, p. 696, the capacities of the Weir steam-electric combination feed-water pump were incorrectly given in the text as 35,000 and 50,000 gallons per minute. These outputs should read gallons per hour, as is indicated correctly under the illustration on p. 697.

Appointments Vacant

Power station superintendent for Ipswich Electricity Department.

Switchboard attendant for Penarth Electric Lighting Co., Ltd.

(See our advertisement pages to-day.)

A Three-floor Power House

The Oberhasli Power Supply Co. has recently erected, about eight miles above Innerthirchen, Switzerland, hydro-electric plant known as the Handeck power station. The initial plant comprises four sets of turbines and generators with a total capacity of 120,000 h.p. Each set consists of a 30,000-h.p. Pelton turbine working at 500 r.p.m. under a head of about 1,770 ft., directly coupled to an Oerlikon vertical three-phase generator for a continuous output of 28,000-32,000 kVA at 11,000 V, 50 cycles. The general arrangement of the machines is such that the generator is on an intermediate floor of the power station and consequently the thrust bearing, the main exciter, and the two auxiliary exciters alone project above the machine room floor. The turbine wheel is overhung on the lower conical shaft extension of the generator. The supporting frame of the lower guide bearing, which rests in a recess of the circular bedplate, forms a fixed partition between the generator and turbine chambers, so that in the event of any defect occurring in the hydraulic plant, or the turbine chamber being completely flooded, no water can penetrate to the generators.

Educational

MANCHESTER COLLEGE OF TECHNOLOGY.—Prospectuses of degree courses in technology are now available from the Registrar. (See our advertisement pages to-day.)

The Commissioners' Fuel Returns

THE analyses and summaries of the returns of fuel consumption and kWh generated in 1931 made to the Electricity Commissioners by authorised undertakings, railway and tramway authorities, and certain non-statutory undertakings are now available (H.M. Stationery Office, 1s. 6d. net). They follow the general form of the previous issue. Reference is made to the grid regional area in which each power station is situated; selected stations are printed in bolder type; and particulars of kWh generated, maximum demand, load factor, fuel consumption per kWh, and thermal efficiency are given for each station.

Returns were received for 538 stations, a decrease of 21. The difference is due to the permanent closing of 33 stations before January 1st, 1931, the putting into commission of three new stations and one existing stand-by station during the year, and the inclusion of eight existing stations previously operated on a non-statutory basis.

The total kWh generated at these stations was 12,812,700,970, an increase of 3.9 per cent. on the figures for 1930. The total amount of coal, coke, and fuel oil consumed was 9,927,135 tons, a decrease of 0.69 per cent.

Economy of Large Stations

The average fuel consumption for the 300 steam stations, which generated about 12.1 thousand million kWh, was 1.82 lb. per kWh generated, ranging from 1.57 lb. for the group of thirteen stations generating more than 200 million kWh to 10.52 lb. for the group of nine stations generating less than 50 thousand. The fuel consumption per kWh shows a progressive increase for the intermediate eleven groups arranged in accordance with decreasing output.

Though not quite so regular the returns from the 162 oil and 31 producer-gas stations (which between them generated some 100 million kWh) show a similar tendency in group averages. The one oil-engine station, generating more than five million kWh, required 0.63 lb. of fuel per kWh, and the 28 stations generating less than 50,000 required 1.17 lb. The one producer-gas station, with an output exceeding 2½ million kWh, used 2.06 lb. of fuel per kWh, while the seven stations with outputs of less than 50,000 used 3.13 lb.

There were 97 composite stations (52 of which are also included in the foregoing) comprising waste heat or gas, refuse, town's gas, and water power generators, with a total output of about 568 million kWh.

The percentages of the total units generated by different types of plant were: steam, 95.12; oil, 0.67; producer-gas, 0.09; waste heat and gas, 0.99; refuse, 0.18; town's gas, 0.01; water, 3.25.

Apart from the North and South Scotland areas, where increased outputs from water-power schemes influenced the situation, the greatest progress was made in East England (14.88 per cent.), followed by South-East England (7.69 per cent.). Decreases occurred in Central Scotland (9.01 per cent.) and in S. and W. England and S. Wales (7.62 per cent.).

Individual Performances

The station which put up the highest thermal efficiency (31.8 per cent.) was, as in previous years, an oil-engine station—Buxton, with a load factor of 28 per cent. (based on running hours) and an output of just over one million kWh; it also had the lowest fuel consumption per kWh generated (0.58 lb). Of the capital stations the best thermal efficiency (24.02 per cent. for 315 million kWh and 44.1 per cent. l.f.) was shown by Deptford West (London Power Co.), but the lowest coal consumption per kWh generated (1.20 lb.) was claimed by the Kearsley station (Lancs E. P. Co.) for 153 million kWh, 35 per cent. l.f., and 23.85 per cent. efficiency.

Curiously, but significant of the difference between thermal efficiency and fuel consumption, Deptford (1.27 lb.) did not secure the first place for fuel consumption in its own group of stations with outputs exceeding 200 million kWh, that honour falling to North Tees (N.E.S. Co.), the output of which was 290 million kWh with a load factor of 60.2 per cent., with 1.24 lb. per kWh; its thermal efficiency was 23.14 per cent.

Over 20 Per Cent. Thermal Efficiency

Other notable performances by steam stations were those of Hams Hall (Birmingham), 22.24 per cent.; Portishead (Bristol), 21.02; Barking (County of London Co.), 23.44; Spondon (Derby & Notts E.P. Co.), 23.23; Portobello (Edinburgh), 21.03; Kirkstall (Leeds), 21.95; Clarence Dock (Liverpool), 22.11; Lister Drive No. 3 (Liverpool), 20.21; Dentford East (L.P. Co.), 20.34; Barton (Manchester), 21.61; Brimsdown B. (North Met. Co.), 20.73; Chadderton (Oldham), 20.01; Bonnybridge (Scottish Central E.P. Co.), 20.73; Hartshead (Stalybridge Electricity Board), 20.27; and Ferrybridge Y.E.P. Co.), 22.72.

Over 50 per cent. of the output of steam stations came from those generating over 100 million kWh per annum and nearly 80 per cent. from those generating over 50 million kWh.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

The Birthday Honours.—The Honours List, published on the King's Birthday (Friday last) included a number of gentlemen connected in one way or another with electrical affairs.

Mr. A. H. Preece, M.I.E.E., who receives a knighthood, is the son of the late Sir William Preece, and a partner in the firm of Preece, Cardew and Rider, the well-known consulting engineers to the Crown Agents for the Colonies, municipalities and companies.

Mr. W. F. Fladgate, who also receives a knighthood, is chairman of the London Power Co. and of the Charing Cross Electricity Supply Co., Ltd. An outline of his career was given in our issue of February 3rd, 1928.

Others upon whom a knighthood has been conferred are: Dr. R. L. Mond, president of the Faraday Society; Vice-Admiral C. D. Carpendale, C.B. (retired), controller of the British Broadcasting Corporation; Mr. J. B. G. Smith, Indian service of engineers, chief engineer and secretary in the Irrigation Branch of the Public Works Department of the Punjab; Mr. A. A. Musto, superintending engineer of Lloyd Barrage Circle, Sukkur, Bombay; and Mr. T. M. Ainscough, H.M. Senior Trade Commissioner in India and Ceylon.

Dr. C. V. Drysdale, M.I.E.E., director of the Department of Scientific Research and Experiment at the Admiralty, an account of whose career was given in our issue of November 8th, 1929, has been made a C.B. (Civil Division).

The C.B.E. (Civil Division) is conferred upon Mr. G. McNamara, secretary of the New Zealand Post and Telegraph Department; Mr. D. W. Gumbley, Inspector-General of the Posts and Telegraphs, Director of Civil Aviation, and Minister of Economics and Communications, in Iraq; Mr. J. S. Jones, Controller of the Central Telegraph Office of the G.P.O.; Mr. A. B. Hart, M.I.E.E., Assistant Engineer-in-Chief, G.P.O.; and Mr. G. Shearing, M.I.E.E., Principal Scientific Officer at the Naval Signal School, Portsmouth.

Mr. S. C. Bartholomew, M.I.E.E., Assistant Staff Engineer at the G.P.O., is awarded the M.B.E. (Civil Division); and Mr. E. C. B. Walton, hydro-electric engineer of the United Provinces, receives the O.B.E. (Civil Division).

Mr. E. C. D. Rawlins, Commercial Counsellor at H.M. Legation in Vienna, becomes a C.M.G. The Rev. R. R. Hyde (Industrial Welfare Society) is awarded the M.V.O.

Blackpool Town Council has approved a resolution of the Electricity Committee that **Mr. C. Furness** be appointed borough electrical engineer at a salary of £1,600 per annum, when a new transport manager is appointed. Mr. Furness has carried out the double duties of transport manager and electrical engineer, but the Corporation has now decided that the two offices shall be held by different officials.

Mr. R. H. Wilmot, author of the article on p. 837 of this issue

Mr. R. H. Wilmot, whose article on the Howrah Jute Mills appears elsewhere in this issue, gained the B.Sc. degree with first-class honours in electrical engineering in 1924 at Bristol University, and in 1927 was awarded the M.Sc. degree. From 1924 to 1926 he was a college apprentice with the Metropolitan-Vickers Electrical Co., Ltd., and from 1926 to 1929 he was on the staff of the company's general engineering department dealing with industrial electrification work. From 1929 to the present time he has been chief lecturer in electrical engineering at Leicester College of Technology. He is a member of the Textile Institute and is author of "Theory and Electrical Drive of the Loom."

Mr. J. M. Crawford, who is to represent the Australian Government at the International Electric Congress in Paris next month, was given a farewell luncheon in Melbourne before his departure by the Victorian Committee of the Institution of Electrical Engineers, and the Committee of the Electrical Engineering branch of the Australian Institution of Engineers, of which he is vice-chairman.

In the Honours List: (left to right) Dr. C. V. Drysdale (*Elliott and Fry*); **Mr. W. F. Fladgate** (*Elliott and Fry*); **Mr. A. B. Hart, and Vice-Admiral C. D. Carpendale** (*Press Portrait Bureau*)

In consequence of the opening by the Liverpool Corporation of the Clarence Dock power station, it is proposed to make a number of staff changes. According to a report presented to the City Council, **Mr. H. A. W. Williams** has been selected for the position of resident engineer; he is at present station superintendent at Lister Drive power station. In charge of the generating plant will be **Mr. S. R. Hollway,** who has been acting engineering clerk of works at the new station and who has been shift engineer at Lister Drive. Other recommendations include the following:—Mr. H. Berry, shift engineer at Lister Drive station, to be senior shift engineer at Clarence Dock; Mr. E. J. T. Rattray to be placed in charge of the laboratory; Mr. J. A. Phillips, h.p. switchboard examiner at Lister Drive, to be electrical superintendent at Clarence Dock station; Messrs. J. W. Johnston, J. L. Rooney, B.Eng., E. H. Jones, assistant shift engineers, to be appointed as engineers in charge of a shift at Clarence Dock; Mr. F. Cross to take charge of the electricians at Clarence Dock. Mr. K. McG. Fergusson is to be promoted to the position of station superintendent at Lister Drive; Mr. H. W. Jones, in charge of the generating plant at Lister Drive is to be assistant to the station superintendent; Mr. C. W. Bostock, shift engineer at Lister Drive, will be senior shift engineer; Mr. G. A. Thompson, superintendent engineer in charge of boiler house at Lister Drive No. 3 station, is to take full charge of a shift; Mr. J. A. Robinson, station electrician at Lister Drive power station, will become assistant electrical engineer; Mr. C. Parcell will be appointed assistant maintenance engineer; and Mr. S. B. Sharpe, B.Sc., will be works chemist.

The John Price Wetherill medal has been bestowed by the Franklin Institute in Philadelphia on **Messrs. Carl Munters** and **Balzar von Platen,** who invented the refrigerator now marketed by the Elektrolux Co.

Mr. J. A. Crabtree has been elected as first vice-president for 1932-33 of Rotary International in Great Britain and Ireland.

Mr. F. E. Cook has been appointed by the Transport Committee of the Southport Corporation as maintenance engineer at a salary of £300 a year, rising to £350.

Mr. A. C. Tilley, general manager of the Chloride Electrical Storage Co., Ltd., in South Africa, has arrived in England. On his return to Africa later in the year he will make a tour of Central Africa and the Congo before proceeding to Cape Town.

Mr. C. N. Hayward has been elected chairman of the Gloucestershire branch of the Electrical Contractors' Association.

Mr. J. F. Laskey, of the Eastbourne Corporation Electricity staff, who was married on June 2nd to Miss F. I. Trigwell, of Seaford, was presented by his colleagues with a vacuum cleaner, an electric fire and an electric tie restorer.

We regretted to hear at the jubilee luncheon of Pritchett and Gold and the E.P.S. Co. that **Sir Tom Callender** was prevented by ill-health from attending; we wish him a speedy recovery.

At the annual meeting of the Ayrshire Electricity Board held on May 26th **ex-Provost Mathew Smith** was reappointed chairman, and **Bailie Ritchie Scott** vice-chairman.

Mr. Philip H. Cull, sales engineer and contracts manager of the East African Power & Light Co., Ltd., is in England on leave. He asks for up-to-date catalogues to be sent to him at 66, Queen Street, E.C.4.

Mr. Bernard J. Keogh has been appointed manager of the Dublin branch of Standard Telephones and Cables, Ltd., in succession to his brother, Mr. L. J. Keogh, who died early in April.

Mr. F. S. Whittaker, rolling stock superintendent of the Burnley Corporation tramways, was recently presented with a reading lamp, radiator, and a pair of candlesticks by the staff on his retirement. Mr. H. Mozley, former general manager, made the presentation, and Mr. C. H. Stafford, the present manager, presided.

Mr. T. I. Rudman, permanent-way engineer of Sunderland Corporation tramways, has received several presentations from the staff on the occasion of his retirement.

Mr. H. J. Hicks has resigned from his position in charge of the Publicity Department of Messrs. J. H. Tucker & Co., Ltd., to take up a position with the Cressall Manufacturing Co., in which he will deal with sales in addition to publicity.

Obituary

Sir Dorabji Tata.—The death is announced of Sir Dorabji Tata, which occurred at Kissingen on June 3rd at the age of seventy-two. He was chairman of a number of Indian companies, including the Tata Hydro-Electric Power Supply Co., Ltd., and the Tata Power Co., Ltd.

Mr. Patrick St. John Lisle, who went to South Africa in 1927 as technical representative of the Westinghouse Brake and Saxby Signal Co., Ltd., has died at Johannesburg at the age of 50. Following his work on the installation of power and colour light signals on the Cape Town suburban lines he was engaged in similar work at Johannesburg's new station. Latterly he was attached to Messrs. Hubert Davies & Co., Ltd., the company's South African agents.

Mr. T. Cobbe.—The death has taken place at his residence at Southend-on-Sea of Mr. Thomas Cobbe, A.M.I.E.E., sectional engineer for Southend of the postal engineering department. He was previously at Dublin, London and Cambridge.

Mr. E. Gregson.—The death is reported of Mr. Ewart Gregson, chief telegraph engineer of the Posts and Telegraphs Department, Tanganyika Territory, which occurred on May 17th on board the *Durham Castle*. He was buried at sea.

Mr. O. Schlanbusch.—The death by accident occurred recently, at the works of Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, of Mr. Otto Schlanbusch, B.Sc., of the scientific staff. He was 23 years of age.

Mr. J. Thomson.—The death is reported of Mr. James Thomson, a well-known Aberdeen electrical engineer and contractor, which occurred at his residence, 9, Burnett Place, on May 26th, after an illness which lasted for about six months. Mr. Thomson was for many years in the employ of Messrs. Pratt & Keith, Aberdeen, latterly as manager of the firm's electrical department. In 1914 he commenced business on his own account and carried out a number of important contracts in Aberdeen and district. He was for some time chairman of the Aberdeen branch of the E.C.A. of Scotland. Mr. Thomson was 68 years of age.

Mr. W. E. James.—The death occurred on May 29th of Mr. G. W. James, electrical engineer and manager to the Heston and Isleworth Urban District Council's electricity undertaking. Mr. James, who had been with the Council since 1905, succeeded Mr. P. Rycroft as engineer and manager in 1919. He had had electrical experience at Eccles and Ipswich before going to Heston and Isleworth.

Mr. T. Pearson.—The death has occurred of Mr. T. Pearson, Divisional Engineer of Telegraphs and Telephones in the Transvaal. Mr. Pearson entered the service of the British Post Office at Newcastle-on-Tyne in 1898, and was transferred to the Cape service in 1901. After holding various posts there he was appointed divisional engineer in the Transvaal in December last. The recent conversion to automatic telephony in Johannesburg was completed under his supervision.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

A. Saunders, Ltd.—Private company. Registered May 28th. Capital £100 in £1 shares. Objects: To acquire the business and assets of Mrs. R. Saunders, trading as A. Saunders, and to carry on the business of mechanical and electrical engineers, &c. The directors are: Mrs. R. Saunders, 21, Second Avenue, Acton Vale, W., and Mrs. F. Kurlander, 106, Hallam Street, W.1. Registered office: 161, Dalling Road, Hammersmith, W.6.

Wendell Radio, Ltd.—Private company. Registered June 2nd. Capital, £1,000 in £1 shares. Objects: To carry on the business of designers, manufacturers, engineers, advisers, experts, and consultants in connection with wireless telephony or telegraphy, television, &c. The directors are: F. Dawson, 6, Cloister Road, N. Acton, W.3, and S. F. Ward, 93, Grove Park Road, Chiswick, W.14. Registered office: Abbey Road, Park Royal, N.W.

London Electric Service, Ltd.—Private company. Registered May 30th. Capital, £5,000 in 4,500 6 per cent. cumulative participating preference shares of £1, and 2,000 ordinary shares of 5s. each. Objects: To carry on the business of general and electrical engineers and contractors, manufacturers of and dealers in and marketers of sound equipment apparatus, and theatre and cinematograph equipment, &c. The directors are: J. Woodward, 19, St. Andrews Chambers, Wells Street, W.1; T. B. Worley, 33, Telford Avenue, S.W.2; and P. Cogswell, 191, Queen's Road, Bayswater, W.2. Solicitors: Ashfield, Rose & Co., 12, Henrietta Street, W.C.2.

H. Hebblethwaite (Leeds), Ltd.—Private company. Registered May 26th. Capital, £100 in £1 shares. Objects: To carry on the business of radio and electrical factors, manufacturers of and dealers in wireless apparatus, electrical fittings, &c. The directors are: H. Hebblethwaite and Mrs. Ruth Hebblethwaite, both of 19, Purlwell Hall Road, Batley. Solicitor: H. H. Hyams, LL.B., 7, Park Square, Leeds.

Some of the Post Office (London) Railway's new rolling stock. Right: Mounting the electrical equipment on a bogie

Vernon Electrical Co., Ltd.—Private company. Registered May 27th. Capital, £1,000 in £1 shares. Objects: To acquire the business of electrical instrument and equipment manufacturers, carried on by A. W. Hart and E. C. Pyatt, at Everleigh Works, Everleigh Street, N.4, as A. W. Hart & Co. The directors are: A. H. Thompson, 4, Chelmsford Road, Northend, Portsmouth, works manager; and W. H. French and W. Derrick, both of 21, Cardiff Road, Luton. Secretary: W. Derrick. Registered office: Everleigh Works, Everleigh Street, Tollington Park, N.4.

Grampian Reproducers, Ltd.—Private company. Registered May 31st. Capital, £3,000 in £1 shares. Objects: To carry on the business of electrical and radio wholesalers, manufacturers of radio apparatus, &c. The subscribers are: C. R. Churchill, 5, Armitage Road, N.W.11, and J. Kinnear, 44, Whateley Road, S.E.22. Registered office: Station Avenue, Kew Gardens, Surrey.

Dicks Wireless & Electrical Factors, Ltd.—Private company. Registered May 27th. Capital £200 in £1 shares. Objects: To acquire the business of a wholesale and retail dealer in wireless and electrical goods now carried on by F. L. Dicks, trading as "Dicks" and "Grange Radio" at 235, High Road, Kilburn, N.W.6. The subscribers are: F. L. Dicks, 9, Christchurch Avenue, N.W.6, and T. H. Gooch, 42, Tubbs Road, Harlesden, N.W.10. F. L. Dicks is the first director. Registered office: 238, High Road, Kilburn, N.W.6.

Electrical Instrument & Clock Co., Ltd.—Private company. Registered June 2nd. Capital, £100 in £1 shares. Objects: To carry on the business of electrical, lighting, heating, wireless, X-ray, consulting, mechanical and general engineers, &c. The directors are: H. G. Wainscott, 9, Rochdale Road, Edenfield, and A. Exton, 27, Union Street, Bury. Solicitors: Exton & Southworth, 27, Union Street, Bury.

Contacts, Ltd.—Private company. Registered June 1st. Capital, £2,500 in £1 shares. Objects: To carry on the business of manufacturers and distributors of all kinds of electrical goods, and in particular contacts for electrical purposes, &c. The directors are: M. W. Hooker, Palmerston Court, The Leas, Westcliff-on-Sea, and F. V. Shaw, 22, Exbury Road, Catford, S.E.6. Registered office: 2, Gray's Inn Square, W.C.1.

H. Duree, Ltd.—Private company. Registered June 1st. Capital, £1,000 in 10s. shares. Objects: To carry on the business of manufacturers, importers and exporters of, agents for and wholesale and retail dealers in lamp shades, lamps, radio and electrical apparatus, &c. The directors are: Mrs. Winifred H. Woolfe, Nether Court, Mill Hill, N.W.7, and Mrs. Emilie P. Batten, "Weirette," Pentonhook, near Staines. Registered office: 14, East Castle Street, W.1.

Hill & Co. (Radio), Ltd.—Private company. Registered June 3rd. Capital, £1,200 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless and television apparatus, electrical fittings, gramophones, &c. The subscribers are: A. Hill and Mrs. E. Hill, both of 874, Christchurch Road, Bournemouth.

Beacon Radio Manufacturing Co., Ltd.—Private company. Registered June 3rd. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical equipment, electric wires, cables and flexible cords for lighting, heating, power, telephone and wireless work, &c. The directors are: G. I. Rawling and G. E. Rawling, both of St. Omer, Halifax. Registered office: 8, St. James' Road, Halifax.

Service Radio Supply Co., Ltd.—Private company. Registered June 2nd. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless transmitting and receiving sets, component parts and accessories, &c. The directors are: W. Abbott, 57, Seaton Street, S.W.10, and T. P. Tozer, 18, Blechynden Street, W.11. Registered office: 61, Silchester Road, North Kensington, W.10.

Bridge's Radio, Ltd.—Private company. Registered June 4th. Capital, £1,500 in £1 shares. Objects: To acquire the business of wireless and musical instrument manufacturers and dealers carried on by J. Bridge and L. V. Bridge at Southend, Essex. The directors are: J. Bridge (chairman) and L. V. Bridge, both of New Hall, Hockley. Registered office: 31, Warrior Square West, Southend-on-Sea.

Mouldings, Ltd.—Private company. Registered June 4th. Capital, £200 in £1 shares. Objects: To acquire the business of craftsmen in bakelite and plastic mouldings and tool and mould makers to the electrical and other trades, carried on by G. Turnock and W. E. Taylor, trading as "Turnock & Taylor," of 41, High Street, Aston. The directors are: G. Turnock, 41, High Street, Aston, Birmingham, and W. E. Taylor, 38, Calthorpe Road, Handsworth, Birmingham. Registered office: 41, High Street, Aston, Birmingham.

Philco Distributors (Yorkshire), Ltd.—Private company. Registered June 6th. Capital, £5,000 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of and dealers in wireless apparatus, cabinets, loud speakers, receiving and transmission sets, &c. The directors are: C. Greenwood, Grange View, Steeton, nr. Keighley; A. Holmes, 3, East View, Park Road, Crosshills; and H. Cockshott, Avon Leigh, Kildwick Road, Crosshills. Registered office: 3, Queen Square, Leeds.

Returns of Electrical Companies

Waldron Electrical Manufacturers, Ltd.—Debenture dated May 8th, to secure £613 10s. 10d.; also agreement as further debenture endorsed on the above, dated May 11th, 1932, to secure £50; also debenture dated May 8th, 1932, to secure £500. Property charged: the company's undertaking and property, present and future, including uncalled capital. Holders: G. C. Jeremiah and Mrs. B. M. C. Jeremiah, both of Redlands, Queen's Road, Sketty, Swansea.

Independent Battery Co., Ltd.—I. Levy, 27, Chancery Lane, W.C.2, was appointed receiver and manager on May 25th, under powers contained in debenture dated April 13th, 1932. W. J. Moriarty has ceased to act as receiver.

Celestion, Ltd.—Satisfaction in full on April 1st, 1932, of debenture dated August 31st, 1931, and registered September 3rd, 1931, securing £5,500.

Gorford Bros., Ltd.—W. A. Bridge, 3-5, Oxford Street, W.1, was appointed receiver and manager on May 27th, under powers contained in debentures dated March 30th, 1932.

Price's Electrical Supplies, Ltd.—Capital, £3,000 in £1 shares. Return dated November 27th, 1931. 1,210 shares taken up. £1,210 paid. Mortgages and charges, nil.

Great London Power Co., Ltd.—Capital, £100 in £1 shares. Return dated December 30th, 1931. 100 shares taken up. £100 paid. Mortgages and charges, nil.

Showler, Ltd.—Capital, £750 in 250 preference and 500 ordinary shares in £1 shares. Return dated December 15th, 1931. 250 preference and 21 ordinary shares taken up. £271 paid. Mortgages and charges, nil.

National Lighting Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 30th, 1931. All shares taken up. £800 paid. £200 considered as paid. Mortgages and charges, nil.

Boxer Radio Co., Ltd.—Capital, £550 in £1 shares. Return dated February 4th, 1932. 250 shares taken up. £250 paid. Mortgages and charges, nil. A return of allotments made February 12th, 1932, shows a further 200 shares allotted, payable in cash, and fully called up.

Rectifiers, Ltd.—Capital, £2,000 in £1 shares. Return dated December 31st, 1931. 795 shares taken up. £795 paid. Mortgages and charges, nil. A return of allotments, made February 19th, 1932, shows a further 761 shares allotted, payable in cash, and fully called up.

Hellesens, Ltd.—Deposit on May 12th, 1932, of land certificate relating to factory and premises at Morden Road, South Wimbledon, to secure all moneys due or to become due from the company to the Westminster Bank Ltd.

Glick's Radio, Ltd.—Particulars filed of £1,000 debentures authorised May 13th, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £800.

Pix Valves, Ltd.—Debenture dated May 21st, to secure £1,000, charged on the company's property, including uncalled capital. Holder: C. S. Garland, Oaklands, Battenhall, Worcester.

Peto Scott Co., Ltd.—Particulars filed of £30,000 debentures authorised May 11th, 1932, charged on the company's undertaking and all property, including uncalled capital, the whole amount being now issued.

Bond Wholesale Electrical Co., Ltd.—P. T. Muggison, Corridor Chambers, Market Place, Leicester, was appointed receiver and manager on May 13th, under powers contained in debentures dated July 15th, 1931, and January 6th, 1932.

Yale Electric Power Co., Ltd.—Capital, £20,000 in 3,300 preference of £1 each and 668 ordinary shares of £25 each. Return dated December 8th, 1931. 1,000 preference and 668 ordinary shares taken up. £16,000 paid on 1,000 preference and 600 ordinary shares. £1,700 considered as paid on 68 ordinary shares. Mortgages and charges, £1,323 (bank overdraft, secured by £6,000 debentures).

Vergette & Co., Ltd.—H. C. Mundy, 194, Lavender Hill, S.W.11, was appointed receiver on May 19th, under powers contained in first mortgage debenture dated February 27th, 1932.

St. Mary's (Scilly) Electricity Supply Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated May 20th, to secure all moneys due or to become due from the company to Barclays Bank Ltd.

Lighthouse Electrical Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated May 18th, to secure all moneys due or to become due from the company to Barclays Bank Ltd.

L.E.S. Distributors, Ltd.—Capital, £5,000 in 1,000 ordinary and 4,000 preference shares of £1 each. Return dated January 1st, 1932. 750 ordinary and 3,750 preference shares taken up. £3,750 paid on the preference shares. £750 considered as paid on the ordinary shares. Mortgages and charges, nil.

Hanson Electrical Supplies, Ltd.—Capital, £200 in £1 shares. Return dated December 15th, 1931 (filed February 11th, 1932). 198 shares taken up. £198 paid. Mortgages and charges, nil.

Telephone & Associated Services, Ltd.—Capital, £15,000 in £1 shares. Return dated March 11th, 1932. 12,002 shares taken up. £2 paid. £12,000 considered as paid. Mortgages and charges, nil.

Davis Electrical Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1931 (filed March 3rd, 1932). 677 shares taken up. £377 paid. £300 considered as paid. Mortgages and charges, nil.

Young, Osmond & Young, Ltd.—Capital, £18,000 in 17,500 preference and 500 ordinary shares of £1 each. Return dated January 12th, 1932. 17,500 preference and 45 ordinary shares taken up. £17,545 paid. Mortgages and charges: £7,000.

Brownie Wireless Co. of Great Britain, Ltd.—Capital, £10,000 in £1 shares. Return dated December 31st, 1931 (filed March 17th, 1932). 9,720 shares taken up. £9,720 paid. Mortgages and charges: £7,000.

Ultra Electric, Ltd.—Capital, £5,000 in £1 shares. Return dated December 16th, 1931. All shares taken up. £3,000 paid. £2,000 considered as paid. Mortgages and charges, nil.

Edmundson's Electricity Corporation, Ltd.—Issue on May 26th of £490,000 debentures, part of a series already registered.

Entwisle & Gass, Ltd.—Satisfaction to the extent of £5,000 on May 9th, 1932, of 5 per cent. guaranteed first mortgage debenture stock secured by trust deed dated April 13th, 1929, and registered April 25th, 1929. (According to the register of mortgages, the trust deed registered April 25th, 1929, originally secured £30,000 debenture stock.)

City Notes

The Brush Electrical Engineering Co., Ltd., held its annual meeting on Monday last. Mr. F. R. Davenport presided in place of Lord Vaux of Harrowden (chairman), who was indisposed, and read the chairman's speech. In presenting the report and accounts, the chairman said the gross profit on trading of £15,251 represented a reduction of £51,505 upon the preceding year's figures, and reflected the unprofitable character of much of the business undertaken, as well as the reduction in actual turnover. Stocks and work in progress were reduced by £58,746 to £200,497, this being partly due to the smaller value of the contracts in hand and partly to a more conservative policy with regard to stocks. The principal difficulty they had experienced during the year had been the lack of orders of a character suited to the heavy engineering equipment. Both the home market and the export market for turbine plants were extremely quiet. Reference was made last year to the development of the 50,000/60,000-kW Brush-Ljungstrom unit, but there were no orders placed in this country during 1931 for plant of this size. A 50,000-kW unit of the Ljungstrom design was, however, put into service in Sweden early in the current year, and was showing a higher efficiency than had been published for any other steam turbine plant. The Transformer Department had been busy during the year, although prices had been very low as a consequence of intense competition. Extensions to this Department were nearing completion which would improve their testing facilities, enlarge the manufacturing space available, and provide for the production of larger transformers than could previously be handled. The Rolling Stock Department had been fully occupied, mainly with omnibus bodies, although tramcars were manufactured for Leeds and Walthamstow, and tramcar trucks for several operators. Competition was, however, increasingly severe, not only between the usual manufacturers, but also on account of the entry into this market of firms which had previously confined themselves to the other types of rolling stock. The small amount of business available compared with the normal output of the works had necessitated considerable reductions of staff. A reduction of 5 per cent. had also been made in staff salaries and in directors' fees. The developments which had been in hand had been mainly in connection with their normal products, and had therefore not compensated for shortage of orders in these Departments. The attention of the directors and management was being directed continuously to the development of new lines of manufacture, particularly for the engineering side of their business. It had been necessary to agree with the co-partners a modification to the co-partnership deed to allow for the increased provision for depreciation. It was not possible to look with confidence to an early improvement in the general situation, but they were in a position to take advantage of any revival of trade. They were maintaining their works properly; they had good reserves; and they had a large connection of satisfied consumers who should be a valuable asset when times improved.

The Insull Group.—A *Reuter* message from Chicago states that Mr. Samuel Insull has resigned from his position as director of his utilities concerns, owing to ill-health. Mr. James Simpson, who was born in Glasgow, has been appointed chairman of the board of the Commonwealth Edison Co., the People's Gas Light & Coke Co., and the Public Service Co., of Northern Illinois. The three companies are those recently stated by Mr. Insull to be "separate and independent concerns." Receivers have been recently appointed for the Middle West Utilities Co. and applications have been made for the appointment of receivers for the Insull Utilities Investments Inc., the Corporation Securities Co., of Chicago, and the Mississippi Valley Utilities Investment Co.

The Electric Construction Co., Ltd., held its annual meeting on Wednesday last, Mr. J. Gray (chairman) presiding. In presenting the report and accounts (ELEC. REV., June 3rd, p. 829), the chairman said that in spite of slight temporary improvements, the position of trade generally to-day was no better than last year. Reduced consumption had coincided with increased production, with an inevitable reduction in prices. The electrical industry had probably suffered less in the aggregate from these causes than most others, but the demand had been for large sets, which were manufactured by a limited number only. The former demand for smaller and medium sized sets had diminished, and in consequence of the general depression in trade, orders for motors had not been sufficient for concerns like their own to compensate for the practical disappearance of orders for generators. The greatly reduced demand for export had made it still more difficult. An increased demand, however, had arisen since the close of the financial year. Further economies had been introduced, but there was not much scope for these now. During the year various developments in their manufactures had been made, but time was required before any advantage could be obtained from these, particularly when capital expenditure on every hand was being reduced to a minimum. The additions to "properties" in the balance sheet represented accommodation and tools necessary for the manufacture of transformers. The financial position of the company was strong, and it possessed ample resources to take advantage of any general improvement in trade, or to view without apprehension a continuation of the present depression.

The British Electric Traction Co., Ltd., reports a revenue for the year ended March 31st last of £410,566, as compared with £422,826 in the preceding year, and after deducting general expenses, income tax, debenture interest, &c., there is a balance of £254,314. It is proposed to pay dividends of 8 per cent. for the year upon the preferred ordinary stock, and 5 per cent. upon the deferred ordinary stock, leaving £95,304. A year ago the chairman outlined a scheme for the capitalisation and distribution to the deferred ordinary stockholders of a portion of the undivided profits. The directors have now decided that a bonus distribution of 100 per cent. in stock will be the most advantageous course. They therefore recommend that £202,889 of the undivided profits be capitalised and distributed to holders of the deferred ordinary stock in fully-paid deferred ordinary shares of £1 each, to be subsequently converted into deferred ordinary stock. Subject to this proposal being approved, it is recommended that a further dividend of 2 per cent. be paid on the preference stock, making a total dividend of 8 per cent. for the year. Meeting: June 21st.

Telephone Rentals, Ltd., in its report for the year ended May 31st, states that all the subsidiary operating companies, except the Belgian concern (which sustained a loss of under £400), worked at a profit during 1931. The profit of the British and Australian subsidiary operating companies available for distribution in respect of 1931 amounted to £62,348, of which £14,651 was deducted for income tax, and £47,247 paid in dividends to the parent company, £449 being carried forward. The net profit of Telephone Rentals was £44,614 (against £48,330 in the preceding year), to which is added £17,552 brought in, making £62,166 available. It is proposed to pay a final dividend of 4 per cent., making 6½ per cent. for the year (against 6 per cent.), and to carry forward £12,916.

The Abitibi Power and Paper Co., one of the most important Canadian industrial concerns, has omitted the half-yearly interest on its first mortgage 5 per cent. bonds totalling over $48,000,000. The omission is "for the present and until the pending arrangements regarding one of the company's subsidiaries are completed." The balance sheet showing the position of the company on April 13th indicates that the earnings for the first four months of 1932 are only slightly below those for the corresponding period of 1931.—*Reuter* (Toronto).

The International Paper & Power Co., in its report for 1931, states that the consolidated earnings, after deducting interest, &c., amounted to $8,557,189. Dividend payments on the preferred shares charged against surplus during the year amounted to $1,632,565, leaving a balance of $6,924,624. Depreciation charges amounted to $7,938,950, resulting in a reduction in surplus for the year of $1,014,326.

The Madras Electric Supply Corporation has intimated that it will redeem the 7 per cent. second (registered) debentures on December 1st, 1932, at 102 per cent. Holders who desire to have their debentures redeemed prior to that date are notified that the company is prepared to do so on June 14th, provided notice is received by June 10th.

The International Hydro-Electric System reports that the consolidated net earnings for 1931, after deducting all prior charges, amounted to $2,718,059, equivalent to $3.20 per share on the class "A" stock, or more than 1½ times the dividend requirements. This compares with earnings of $4.30 per share on class "A" stock in 1930.

Mirrlees, Bickerton & Day, Ltd., have recommended an ordinary dividend of 2½ per cent. for the year ended March 31st last (against nil for the preceding year).

The Great Northern Telegraph Co., Ltd., of Denmark reports total receipts for 1931 of £1,108,485 (against £1,153,349 for 1930), and net receipts of £379,989 (against £403,379). The distribution for the year is maintained at 20 per cent. The company has declared an interim dividend of 2½ per cent., less tax, in respect of the current year.

Stocks and Shares

TUESDAY EVENING.

THE strength of the market in gilt-edged stocks remains unabated. Absence of any intimation in respect of a conversion scheme for the five per cent. War Loan has no retarding effect upon the rises which are taking place almost every day in securities of the best class. In those markets where the supply is strictly limited, such, for instance, as that in the department for London electricity issues, fluctuations in price occur but seldom. Investment seeks those avenues in which a tolerably free market in stocks and shares prevails, and the activity is marked most of all in British Government issues, where the negotiation of huge blocks of stock gives the market freedom and elasticity. The 4½ per cent. debenture stock of the Central Electricity Board is 97 ex dividend, being about 1¼ higher allowing for the deduction; at the present figure the return comes to £4 12s. 9d. per cent. on the money. The Home Railway debenture stocks keep steady, Metropolitan District 5 per cent. debenture at 7½ premium, Metropolitan 5 per cent. debenture at about ¼ less.

Metropolitan Railway Boomlet

Amongst the ordinary stocks and shares in the Home Railway Market, Metropolitan consolidated stands out as a striking feature. The price of 51½ shows a gain of 10 points on the week. It has been as high as 53, compared with 34½ at which it stood at the end of April last. Mention has been made in these columns almost every week of the reports and rumours with which Metropolitan stock has lately been surrounded. Of these, the first suggested that the Metropolitan was to receive better terms in the London Traffic Pool than were originally proposed. More lately, an old rumour revived in hints that the Underground Railways of London have determined to take over the Metropolitan system. To this latter was tacked the talk of the Metropolitan ordinary stock being exchanged, subject to the proprietors' sanction, for a new 3 per cent. guaranteed stock. Meanwhile, the board has said nothing to enlighten the Metropolitan stockholders as to the reason for the swift advance in price. In the market, the mysterious movements have aroused a not unnatural suspicion that leakage of information must have occurred, and that the buyers of the last few weeks were acting upon expectations as to which the outside shareholder was ignorant. No directors can be expected to dash into print whenever there are violent fluctuations in the prices of the stocks in their companies, but when a Home Railway stock rises 17 points within six weeks it would seem reasonable to assume that there must be some very unusual cause, and that, if the directors are aware of it, they might give the shareholders some hint as to what is going on. To this no doubt the official reply would be that any public intimation might jeopardise the success of negotiations—presuming, of course, that there are negotiations in progress.

Amongst the other London Electric railway stocks, Districts are down a point, at 50½. Underground Electrics remain at 17s. It will be noticed that Metropolitans have now drawn a trifle ahead of Districts.

Electricity Supply Shares

Metropolitan Electric ordinary are a firmer market at 42s. St. James' at 28s. 6d. have gained the pence. The provincial issues are steady. West Gloucestershire 5½ per cent. debenture improved to 105. In the overseas lists, Calcutta Electric shares have drooped to 1⅞; Shanghai Electric Constructions are ex dividend at 52s. 6d. Melbourne Electric Supply ordinary stock at 90 is 5 points down.

After being somewhat dull, the market for new issues took a turn for the better. The County of London Company's new ordinary shares are 2s. premium, which is a few pence better than they were last week. Scottish Power new preference, after being down to 3d. premium, strengthened to 9d. premium. Edmundsons' 6 per cent. preference fell back to 3d. discount on the issue price of a guinea before they recovered to 3d. premium. The company's newly-issued 5 per cent. debenture has risen to 100½. The new Madras Electric ordinary are 3d., and the preference 6d., both premium. Ever Ready new shares, which had been down to 8s. premium, rose to 11s. premium. These new shares are now fully paid, and are quoted at 21s., the same price, that is to say, as the old.

British Electric Traction

British Electric Traction deferred stock has fallen 25 points to 650. The report shows a disposable balance of £254,314, being a decrease of £16,700 as compared with the previous year. As already announced, the deferred ordinary stock is to receive 5 per cent. cash dividend and 100 per cent. bonus in stock. The preference holders are entitled to receive a further dividend of 2 per cent., making 8 per cent. for the year, if this proposal is approved. The National Electric Construction Company, which is a baby of the British Electric Traction, has decided to offer its shareholders 80,000 shares, of 10s. each, at a premium of 5s. per share. The net profit for 1931 of £16,900 was almost exactly half that secured in the previous twelve months. The dividend and bonus, 15 per cent. for the year, are, however, the same as those for 1930.

In the foreign tramways group, Anglo-Argentine second preference receded to 2s. 6d.

Cables and Wireless

Attention is directed to the probable issue of the report of the Commission which has been investigating the outlook as it concerns the Cables and Wireless group. The report is expected to make its appearance before Cables and Wireless issues its annual statement. On a little bear covering, prices of the combine's three stocks have slightly improved, the 5½ per cent. preference rallying to 36½, the "A" ordinary to 11¼, and the "B" to 7. Anglo-American Telegraph preferred stock shed 2½, coming back to 94½, and the deferred stock dropped to 21. Globe Telegraph and Trust preference fell another 5s., to 6, and the market as a whole, apart from Cables and Wireless stocks, is disposed to be dull. American Telephone & Telegraph common has lost 10, receding to 120.

Dollar Stocks

American utilities have taken on a brighter complexion by reason of a very substantial pool formed in New York, under powerful auspices, for the purpose of buying bonds in open market, and by this means steadying the Stock Exchange prices that lately have slumped to almost panic levels. The United States is faced with a deficit which for the first eleven months of the fiscal year amounts to 529 million pounds sterling at par, being 324 million pounds sterling more than the deficit had reached in the corresponding period last year. President Hoover has achieved a personal success in persuading his fellow-countrymen to agree to taxation that, it is claimed, will balance the United States Budget, and this constituted another prop for strengthening the foundations of American security. The improvement is at present confined mainly to bond issues.

Latin-Canadians are dull. Montreal Light and Power have receded to 31, Shawinigans to 11, City Services preferred to 15. Brazilian Traction are higher at 11, and there has been a firmer tendency amongst the 5 per cent. bonds of the Brazilian tramways companies. Mexicans are weak, and no recovery has occurred from the slump which overtook their prices last month.

Manufacturing and Miscellaneous

Henley's at 98s. 9d. have recovered their last week's loss, and Callender's rallied to 53s. 9d. Brush ordinary continues at 55, the chairman's speech, read for him at the annual meeting, having no effect upon the price. Telegraph Constructions have gone back 10s. to 9½. General Electrics at 32s. 6d. and Enfield Cable ordinary at 66s. 3d. are both down 1/16.

A considerable failure occurred in the Metal Market at the beginning of this week. Prompt steps were taken to limit the difficulties as much as possible, and the effect of the trouble proved to be comparatively slight. Amongst iron and steel shares, Babcocks rose to 37s. 6d., upon the Government's announcement of its intention to set the iron and steel industry on its legs, if tariffs are capable of achieving this end. Vickers rose from 5s. 3d. to 6s. before they eased off a trifle. The rubber share market remains stagnant.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price June 7.	Rise. or Fall.	Yield. p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	60/9	—	4 18 9
Brompton Ordinary	1	8½	8½	28/–	—	5 0 0
Central Electricity 4½% Deb.	Stock	4½	4½	97	+1½	4 12 9
Charing Cross Ordinary	1	8½	8½	29/–	—	4 16 7
Chelsea	1	8¾	8¾	27/6	—	5 1 10
City of London	1	10	10	38/3	—	5 4 7
Clyde Valley	1	8	7	27/6	—	5 1 10
County of London	1	11	10½	42/–	—	5 0 0
Edmundsons' 7% Pref.	1	7	7	26/6	—	5 5 8
Elec. Dis. Yorkshire	1	9	9	35/–	—	5 2 10
Elec. Supply Corporation	1	11	—	47/6	—	4 12 7
Kensington Ordinary	1	8	8	28/6	—	4 18 3
Lancs. Light and Power	1	6¼	7	26/3	—	5 6 8
London & Home Counties 4½% Deb.	Stock	4½	4½	98	—	4 11 10
London Electric	1	9	9	28/–	—	5 0 0
Metropolitan	1	10	10	42/–	+9d.	4 15 3
Midland Counties	1	7	7	28/9	—	4 17 5
Mid. Elec. Power	1	8	8	30/–	–6d.	5 6 8
Newcastle-on-Tyne Ordinary	1	6	6	23/9	—	5 1 1
Do. 7% Pref.	1	7	7	27/6	—	5 1 10
Northampton	1	10	10	40/9	—	4 18 2
Notting Hill 6% Pref.	10	6	6	11	—	5 9 1
North Met. Elec. 6% Pref.	1	6	6	25/–	—	4 16 6
St. James' and Pall Mall	1	8	8	28/6	+6d.	4 18 3
Scottish Power	1	8	—	28/3	—	5 13 3
South London	1	8½	8½	28/6	—	4 18 3
Urban Ordinary	1	7	—	28/9	—	4 17 5
Westminster Ordinary	1	8½	8½	28/–	—	5 0 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	16/3	—	9 4 8
Yorkshire Elec.	1	8	8	33/9	—	4 14 10
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	72½	—	5 10 4
Metropolitan	,,	4	3½	51½	+10	6 16 0
Do. District	,,	5	4½	50½	–1	8 18 2
Underground Electric	1	8	7	17/–	—	8 4 8
TELEGRAPHS AND TELEPHONES.		1929.	1930.			
American Tel. & Tel.	$100	9	9	120	–10	7 10 0
Anglo.-Am. Tel. Pref.	Stock	6	6	94½	–2½	6 7 0
Do. Def.	,,	1½	1½	21	–1	6 19 6
Cables & Wireless 5½% Pref.	,,	5½	5½	36½	+1	—
Do. A 7½% Ord.	,,	Nil	—	11½	+1½	—
Do. B Ord.	,,	Nil	—	7	+⅛	—
Globe Tel. and T. Ord.	10	10	8½	3½	—	—
Do. do. Pref.	10	6	6	6	–½	10 0 0
Great Northern Tel.	10	20	20	23	—	8 13 10
Marconi-Marine	1	15	15	22/6	—	8 17 9
Oriental Telephone Ord.	1	12	12	2⅜	—	*5 4 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	5½	—	6/3	—	—
Do. do. 2nd Pref.	5	6	—	2/6	–⅛	—
Do. do. 5% Deb.	Stock	5	—	8	—	—
British Electric Traction Def. Ord.	,,	5	5	650	–25	—
Do. do. Pref. Ord.	,,	8	8	125½	—	6 7 6
Brazil Traction	100	8	—	11	+1	—
Brit. Columbia Elec. Rly Pce.	Stock	5	5	89½	—	5 11 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	3/9	—	—
London United Tram Deb.	Stock	4	4	57½	—	6 19 2
Mexico Trams, 5% Bonds	—	5	5	22½	—	22 4 4
Mexican Light Common	100	Nil	Nil	12½	—	—
Do. 7% Pref.	100	7	7	20	—	—
Do. 1st Bonds	—	5	5	52½	—	9 10 6
Victoria Falls Ord.	1	15	15	57/6	—	5 4 4
Yorkshire (West Riding)	1	Nil	Nil	4/6	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	6	16/3	+6d.	4 18 6
Do. Pref.	1	8	8	28/–	–3d.	5 14 4
Babcock & Wilcox	1	15	14	37/6	+6d.	7 9 4
British Aluminium Ord.	1	10	10	21/3	—	4 14 2
British Insulated Ord.	1	15	15	53/9	—	5 11 6
Brush Ord.	Stock	10	5	55	—	9 1 8
Callender's	1	15	15	53/9	+⅛	5 11 6
Do. 6½% Pref	1	6½	6½	25/9	—	5 1 0
Crompton Parkinson Ord.	5/–	30	30	17/6	—	8 11 6
Do. 8% Pref.	1	8	8	27/6	—	5 16 5
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 9 0
Do. 5% Deb.	Stock	5	5	92½	—	5 8 1
Electric Construction	1	5	Nil	7/6	—	—
Enfield Cable Ord.	1	25	25	3⅞	–1/16	7 19 9
English Electric	1	Nil	Nil	8/9	—	—
Do. do. Pref.	1	Nil	Nil	10/–	—	—
Ever Ready	5/–	35	35	21/–	+1/6	8 6 8
Ferranti Pref.	1	7	7	22/–	—	6 7 3
G.E.C. Pref.	1	6½	6½	26/–	—	5 0 0
Do. Ord.	1	14	10	32/6	–⅛	6 3 1
Henley's	1	30	30	4⅛	+⅛	6 1 5
Do. 4½ Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	4/6	—	—
Johnson & Philips	1	10	10	⅝	—	5 14 5
Siemens Ord.	1	7½	7½	21/3	—	7 1 2
Telegraph Construction	12	10	7½	9½	–½	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specification will be printed and abridged and all subsequent proceedings will be taken.

1930

33304. "Band-pass filters." Dubilier Condenser Co. (1925), Ltd. November 19th, 1929. (372739.)

1931

1217. "Electric motor control systems." General Electric Co., Ltd., and H. J. Coates. January 13th, 1931. (372808.)

3483. "Circuit arrangements for setting electric alternators into operation and switching arrangements in X-ray installations." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 22nd, 1930. (372747.)

3572. "Permanent magnets." E. Allen and Co., Ltd., and H. E. Kershaw. February 4th, 1931. (372809.)

3589. "Starting devices for electric motors." British Thomson-Houston Co., Ltd., and C. J. Morton. February 4th, 1931. (372748.)

3655. "Telegraph systems and apparatus therefor." Creed & Co., Ltd. (Teletype Corporation). February 5th, 1931. (372749.)

3729. "Wireless alarm devices suitable for use on ships." Marconi's Wireless Telegraph Co., Ltd., and W. A. Appleton. February 5th, 1931. (372750.)

3821. "Automatic starter for two- and poly-phase a.c. motors." Naamlooze Vennootschap Heemaf. February 27th, 1930. (372752.)

3833. "Electric motors." British Thomson-Houston Co., Ltd., and A. P. Young. February 6th, 1931. (372794.)

3871. "Radio receivers, particularly for use on trains or other moving structures." Marconi's Wireless Telegraph Co., Ltd. February 6th, 1930. (372834.)

3944. "Electric heating elements." C. C. Turner and Young, Osmond and Young, Ltd. February 7th, 1931. (372813.)

4125. "Magneto-electric ignition apparatus." Scintilla Akt.-Ges. March 10th, 1930. (372753.)

4227. "Thermostatic timing devices for controlling electric circuits." General Electric Co., Ltd., and W. H. Peters. February 11th, 1931. (372799.)

4331. "Prepayment meters for electricity or the like." Siemens-Schuckertwerke Akt.-Ges. February 12th, 1930. (372817.)

4406. A.c. generating and/or feeding arrangements for alternating currents of a plurality of frequencies." Standard Telephones & Cables, Ltd., and A. Braaten. February 12th, 1931. (372802.)

4434. "Electrical method of and apparatus for measuring the approach of an aircraft towards the ground." H. Junkers. February 12th, 1930. (372820.)

4481. "Core covering apparatus." Western Electric Co., Ltd. (Electrical Research Products, Inc.). February 12th, 1931. (372821.)

4619. "Dynamo-electric machine frame." Electric Auto-Lite Co. July 23rd, 1930. (372825.)

4635. "Fluorescent screen." Siemens-Reiniger-Veifa Ges. für Medizinische Technik. May 24th, 1930. (372827.)

5242. "Manufacture of magnetic dust cores." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). February 19th, 1931. (372837.)

5252. "Electromagnetically operated switches for use in motor-vehicle headlight dipping arrangements." J. Lucas, Ltd., and S. A. Mason. February 19th, 1931. (372838.)

5285. "Apparatus for dividing in the same ratio the direct and alternating components of an electric current." British Thomson-Houston Co., Ltd., and C. G. Garton. February 19th, 1931. (372842.)

5296. "Metallic-vapour arc lamps." Siemens & Halske Akt.-Ges. March 3rd, 1930. (372843.)

5879. "Telegraph systems." Coventry Automatic Telephones, Ltd., and D. A. Ley. February 25th, 1931. (372852.)

6700. "Electric switches." Standard Cap & Seal Corp. March 5th, 1930. (372864.)

6941. "Systems for the electrical recording of sound." Gramophone Co., Ltd., and N. D. Angier, W. T. Pratt, and H. E. Gauss. March 5th, 1931. (372870.)

6994. "Electric relays." Siemens Bros. & Co., Ltd., and E. A. Forceville. March 6th, 1931. (372873.)

6995/6. "Electric batteries." Siemens Bros. & Co., Ltd., and C. R. Riber. March 6th, 1931. (372874/5.)

7690. "Apparatus for the electrical precipitation of suspended materials from gases." Lodge-Cottrell, Ltd. (International Precipitation Co., Inc.). March 12th, 1931. (372883.)

8997. "Electric glow-discharge tubes." G. Seibt. April 2nd, 1930. (372894.)

9528. "Electric motors." J. E. Allan and D. S. MacLachlan. March 30th, 1931. (372899.)

10413. "Electric gas-filled incandescent projection lamps." W. Berger and H. Mendel. October 25th, 1930. (372904.)

10637. "Electric burglar alarm devices." H. A. Morgan and W. E. Rogers. April 10th, 1931. (372905.)

11024. "Enclosed electrical apparatus." Siemens Bros. & Co., Ltd., and C. R. Riber. April 14th, 1931. (372912.)

11380. "Measurement of properties of liquids of which the electrical conductivity varies with said properties." W. Crockatt & Sons, Ltd., and W. C. Crockatt. April 17th, 1931. (372916.)

12124. "Thermionic vacuum valve rectifier and amplifier." R. T. Dale. April 24th, 1931. (372923.)

12176. "Signalling buoys for wireless transmission and reception." J. Pintsch Akt.-Ges. April 26th, 1930. (372924.)

13111. "Electric couplings." General Electric Co., Ltd., and R. J. Kaula. May 4th, 1931. (372938.)

13470. "Electric light pendants or fittings." E. Jones and S. P. Stubbs. May 7th, 1931. (372941.)

13945. "High-frequency electrode for ozone generators." Bamag-Meguin Akt.-Ges. April 25th, 1931. (372947.)

14105. "Ignition systems." J. J. V. Armstrong (R. Bosch Akt.-Ges.). May 13th, 1931. (Convention date not granted.) (372949.)

14564. "Portable electric lamps." P. S. Haythorpe. May 16th, 1931. (Cognate application 3973/32.) (372951.)

14685. "Electrical circuit arrangements for use in connection with gas devices and other similar apparatus exhibiting negative resistance characteristics." Telefunken Ges für Drahtlose Telegraphie. May 16th, 1930. (372953.)

14894. "Enclosed dynamo-electric machine having a circulating internal current and an exterior current of cooling air." Siemens-Schuckertwerke Akt.-Ges. May 21st, 1930. (372957.)

16112. "Metallurgical and chemical processes carried out in electric radiation furnaces and a furnace for use in carrying out the processes." A. H. Pehrson. June 2nd, 1931. (372964.)

16563. "Electric lamps, more particularly for motor vehicles." R. Bosch Akt.-Ges. June 18th, 1930. (372968.)

16568. "Electric switches of the plug operated type." Wandsworth Electrical Manufacturing Co., Ltd., T. Batchelor, and A. B. Smith. June 6th, 1931. (372969.)

16638. "Electric welding machines." C. A. Hadley and British Electric Welding Machines, Ltd. June 8, 1931. (372970.)

17171. "Rail bond for electric railways." W. Schabelitz. June 12, 1931. (372976.)

18348. "Screening devices for the ignition systems of internal combustion engines." R. Bosch Akt.-Ges. April 20, 1931. (372988.)

18407. "Manufacture of grid leaks and like high electrical resistances." Lissen, Ltd., and W. Walker. June 25, 1931. (372989.)

18896. "Apparatus for reproducing sound or other record from a film." British Thomson-Houston Co., Ltd. June 30, 1930. (372994.)

18910. "Circuit arrangements and apparatus for starting and stopping electric generating plants." S. Turner, Ltd., and A. F. Plint. June 30, 1931. (372995.)

20010. "Electrical transformers." Allgemeine Elektricitäts Ges. July 11, 1930. (373002.)

21404. "Production of photographs, in particular Röntgen-ray photographs." K. Marholt. November 24, 1930. (373009.)

23259. "Circuit breaker provided with extinguishing liquid and with extinguishing chambers surrounding the breaking-gaps." Allmanna Svenska Elektriska Aktiebolaget. August 21, 1930. (373018.)

23322. "Rotary electric switches." R. Bosch Akt.-Ges. September 1, 1930. (373019.)

24061. "Carburisation of electrodes of discharge tubes." Radiotechnique. August 28, 1930. (373025.)

26688. "Metering arrangements particularly applicable for electricity." International General Electric Co., Inc. September 25, 1930. (373,035.)

28079. "Electric lighting, heating and power installations." W. J. Bransom. October 9, 1931. (373039.)

28647. "Electrically heated boilers." D. W. Low. October 15, 1931. (373042.)

28939. "Ignition coils." R. Bosch Akt.-Ges. November 12, 1930. (373043.)

29671. "Protective apparatus for electric circuits." British Thomson-Houston Co., Ltd. October 25, 1930. (373047.)

29930. "Electrically operated valves." Siemens-Schuckertwerke Akt.-Ges. November 27, 1930. (373051.)

29939. "Devices emitting intermittent light signals." C. Zeiss. November 6, 1930. (373052.)

31816. "Electric battery-ignition apparatus." R. Bosch Akt.-Ges. December 5, 1930. (373065.)

32609. "Electric rotary switch for detecting a failing sparking plug." M. Hauser. November 26, 1930. (373070.)

1932

3122. "Method for the compensation of capacity unbalances in the groups of cores of telegraph and telephone cables." Kabel und Metallwerke Neumeyer Akt.-Ges. February 13, 1931. (373087.)

3254. "Protective devices for the optical parts of arc lamps." Zeiss Ikon Akt.-Ges. February 25, 1931. (373088.)

8377. "Picture scanning and composing devices for television apparatus." Fernseh Akt.-Ges. March 27, 1931. (373093.)

12235. "Thermionic valves." P. Freedman. February 4, 1931. (Divided application on 3595/31.) (372758.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from June 1st:—

Lotus (lettering and design). No. 524,960. Class 6. Electric motors, refrigerating machines, fans, electric machines for peeling and slicing vegetables, electric washing, wringing, and ironing machines, electric cream and egg whisking machines, drying machines, vacuum cleaning, dust extracting, and air purifying machines, ice-cream freezing machines, dynamos and electric blowers.—Lotus Radio, Ltd., Lotus Works, Mill Lane, Liverpool.

Kenwell. No. 531,500. All goods in Class 8.—Kenwell Radio, Ltd., 200, City Road, E.C.1.

A.B., Allen Bradley (lettering and design). No. 518,233. Class 8. Battery charging apparatus, electric control apparatus, instruments for varying the potential of electric currents, automatic switches, grid leaks, potentiometers, condensers and rheostats for use in connection with wireless apparatus.—Allen Bradley Co., 1,326, South Second Street, Milwaukee, Wis., U.S.A. (British representatives: Frank B. Dehn & Co., 103, Kingsway, W.C.2.)

Oce. No. 526,149. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—Naamlooze Vennootschap Chemische Fabriek L. Van Grinten, 26, Villapark, Venlo, Holland. (British representatives: Boult, Wade & Tennant, 112, Hatton Garden, E.C.1.)

Roxy. No. 528,240. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—Radio Keith Orpheum Corporation, 1,560 Broadway, New York, U.S.A. (British representatives: White, Langner, Stevens, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, W.C.2.)

ATO (lettering and design). No. 524,144. Class 10. Electrically operated clocks.—La Société des Etablissements Leon Hatot, 12, Rue du Faubourg, St. Honoré, Paris. (British representatives: Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2.)

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alnwick.—Houses (50), Clayport Bank; R. Carse & Son, builders, Amble.

Aylesbury (BUCKS).—Reconstruction, Crown Hotel; architects, Taylor & White.

Barnard Castle (Co. DURHAM).—Conversion of Brampton House into post office, for H.M. Office of Works, King Charles Street, S.W.1.

Birkenhead.—School, Manor Hill; W. Ellis, architect, St. Helens. Development, Prenton Estate, for A. H. Boulton (Prenton), Ltd.; W. Griffiths & Sons. Alterations and additions, Queen's Hotel, Conway Street; licensee.

Blackpool.—Cinema, Pleasure Beach; W. Lewis.

Chesterfield.—Houses (20), Brimington, for R.D.C.; Houfton and Kington, architects, Market Place.

Chester-le-Street (Co. DURHAM).—Houses, Kerrich-Walker Estate (131) and Pelton Fell (75); U.D.C. surveyor.

Chesterton (CAMBS).—Houses (70); R.D.C. surveyor.

Chislehurst (KENT).—Houses, Camden Court and Rosemount; Dyer, Son & Creasey.

Clacton-on-Sea.—Cinema, Old Road and Pier Avenue; G. H. B. Gould, architect, 63, Station Road.

Darlington.—Houses (28), Hundens Lane; borough surveyor, C. Minors, Town Hall.

Dorchester.—Houses (24); R.D.C. surveyor.

Dunfermline.—Sports pavilion (£10,000); secretary, Carnegie Dunfermline Trust.

Edinburgh.—Houses (306); E. J. MacRae, city architect. Totalisators, &c., at Portobello, for Greyhound Racing Assoc., Ltd.; Henry & Munro, architects, West Harbour Road, Granton.

Ellesmere Port.—Shops (11) and houses (16), Whitby Old Hall Estate, for C. W. Hitchen. Housing scheme and shopping centre; U.D.C. surveyor.

Falkirk.—Houses for Corporation (£36,500); borough surveyor.

Fauldhouse.—Church (£4,219); Roberts & Son, architects, Bathgate.

Fifeshire.—Central kitchen, &c., County Asylum (£6,000); Dr. Boyd, superintendent.

Glasgow.—Rebuilding warehouse for Lewis's Royal Polytechnic, Ltd. (£500,000); Clarke, Bell & J. H. Craigie, architects, 227, Bath Street.

Guildford.—Junior schools, Westborough, for the Borough E.C.; director of education.

Hampshire.—School, Hayling Island, for the County E.C.; director of education, Winchester.

Hereford.—Development, Hinton Court Estate; Hiles and Howard.

Herne Bay.—Development of Studd Hill Estate, Herne, for J. Stedman.

Hollinwood (LANCS).—Corpus Christi R.C. Church and Presbytery (£14,000); H. A. Yearsley, architect.

Horsham (SUSSEX).—Houses (166), Brighton Road; U.D.C. surveyor.

Ilford.—Houses (24), Queensborough Gardens; Brand and White, Ltd. Houses (24), Clinton Crescent; G. F. Siegerts.

Irish Free State—(MACETOWN, Co. MEATH).—Housing scheme; M. Deegan, secretary, Irish Land Commission, Upper Merton Street, Dublin.

Kettering.—Houses (76), Pipers Hill; R. J. Jewell & Sons, Ltd. Headquarters, Northampton Road; Northants Territorial Army Association.

Kingston-on-Thames.—Cinema, High Street; J. E. Adamson, architect, 56, Victoria Street, S.W.1.

Lancashire.—Infants' School, Fleetwood (£12,000); director of education, County Education Offices, Preston.

Langho (NEAR BLACKBURN).—Sewage disposal plant; clerk and steward, Calderstones, Whalley.

Leek (STAFFS).—Houses (40), Haregate Estate; U.D.C. surveyor.

Leicestershire.—Senior and junior schools and clinic at Hinckley for the E.C.; E. G. Fowler, architect, Education Offices, Grey Friars. Nurses' home, Knighton Street, for Royal Infirmary; governors.

London.—(CHELSEA).—Shops and flats, Lowndes Square; Messrs. Josephs, architects. (HACKNEY).—Houses (200), Lower Clapton Road; borough surveyor. (ST. PANCRAS).—Highways depôt, Bartholomew Road (£4,345); borough engineer. Nurses' home, St. Andrew's Gardens, for Royal Free Hospital; Ashley & Newman, architects.

Maidstone.—Re-erection of Braham Court, Teston (electrically equipped), for Col. Sir Charles Warde.

Manchester.—Buildings for wireless and meteorology at airport; G. & J. Seddon, Little Hulton.

Mansfield.—Hotel, Sherwood Hall Road; Hornbys, Ltd. School, Ravensdale (£15,920); borough engineer.

Montrose.—Cinema for Dundee Cinema Palace, Ltd.; the secretary, Dundee. Cinema for Angus Playhouse, Ltd.; the secretary.

Morecambe.—Crystal Hall (2,000 seats), Harbour site; Cross & Sutton, architects.

Nantwich (CHESHIRE).—Houses (62), Wallfields Farm Estate; U.D.C. surveyor.

Newcastle-on-Tyne.—School, Benwell; Education Department, Northumberland Road.

Newsham (NEAR BLYTH).—Alterations to Turk's Head Inn; Newcastle Breweries, builders, Newcastle.

Northampton.—Shops, St. Giles Street (£5,500); borough engineer. Fire station, Campbell Square (£30,000); J. C. Prestwich & Sons, architects. Extensions to infirmary, and houses, Bents Lane and St. David's Estate; borough engineer.

North Shields.—Houses, Salisbury Avenue; Hayes & Gray, architects, Camden Street.

Oxford.—Reconstruction of New Theatre, George Street; W. & T. R. Milburn, architects, 17, Fawcett Street, Sunderland.

Pendleton (LANCS).—Re-erection of Star Box Works, Ford Lane, for John Fenton, Ltd.

Reigate.—Sewage disposal scheme, with machinery (£56,202), for T.C.; G. B. Kershaw & Kaufman, engineers.

Romford.—Houses (32), Rainham, for R.D.C.; Pavitt Bros., builders, Aveley, Purfleet.

Salford.—Extensions to works, Richmond Hill, Mount Street, for Thomas Briss (Manchester), Ltd., Manchester; B. Morton & Sons, builders, Quay Street, Manchester.

Selby (YORKS).—Flour mill, for W. L. Kirby, Haslemere, Surrey.

Sheffield.—Houses, Shiregreen; W. Memmory (£29,683) and J. Laver & Sons, Ltd. (£30,778). Hotel, Nursery Street; Sheffield Refreshment Houses, Ltd.

Shipley.—Theatre and shops; G. Whitaker.

Slough.—Houses (100), Meadfield Estate, Langley, for the Langley Development Co., Ltd. Shops, warehouse, &c., High Street; David Greig, Ltd., 45, Waterloo Road, S.E.

Smethwick.—Houses (20), St. Paul's Road; T. Wattern Tew & Co. Factory, Spon Lane; Auto Cellulose, Ltd.

Southgate.—Houses (36), Elmscott Gardens;; G. W. Newman. Extensions, Northmet House, Cannon Hill; North Met. Elec. Power Supply Co.

Southport.—Junior and infants' school, Farnborough Road, for the Borough E.C.; education architect.

Stainland (YORKS).—Telephone exchange, for H.M. Office of Works; O. Atkinson & Sons, builders, Tower Works, Harrogate.

Stretford.—Elementary school, Lower Moss Road, for the U.D.C. Education Committee; Percy Howard, architect, 88, Mosley Street, Manchester.

Swindon.—School, Pinehurst, for E.C.

Torquay.—Cinema, Castle Circus, for Associated British Cinemas, Ltd.; J. Maxwell, Elstree Studios.

Twickenham.—Station for Southern Railway Co., Ltd.

Wallington (SURREY).—Two-storey factory for Helm Chocolate, Ltd., Elm Grove.

Warrington.—Reconstruction, business stores, 45, Sankey Street, for the Gift House.

West Bromwich.—Houses (66), Greets Green Road; Smith & Son.

The Radiovisor Litigation

IN the King's Bench Division, Mr. Justice Lawrence continued the hearing of the action by Radiovisor (Foreign & Colonial), Ltd., of Pall Mall, against Radiovisor Parent, Ltd., claiming £200,000 damages and the return or cancellation of 120,000 £1 shares. The plaintiffs alleged misrepresentation in the disposal to them of foreign rights in a selenium light bridge. This the defendants denied.

As reported in our issue of May 20th, the plaintiff company was formed at the end of 1928 to take over the foreign rights in a selenium light bridge, with a capital of £450,000 in £1 shares. Of this 380,000 had been issued and fully paid. The plaintiffs paid £80,000 to the defendant company for the foreign rights and made to them an allocation of 120,000 fully-paid shares.

The Duke of Atholl, chairman of the plaintiff company, gave evidence and said that he visited the defendants' demonstration laboratory in Coventry Street, where he met Mr. Terrell, who became vice-chairman of the plaintiff company. One of the demonstrators told him that the apparatus was absolutely constant in resistance and varied with the intensity of the light. He was told that the sensitivity of the bridge could be adjusted, and that the parent company was prepared to produce it by mass manufacture. He was told that there was not such a thing as a constant bridge anywhere else, and that nowhere else could the article be produced for half a crown. He was also informed that it had been used successfully in street lighting in Barnes.

He was shown applications of the bridge. He was told that they based their proposition more upon the tried success of the light bridge in the public lighting of Barnes than upon anything else. He heard no suggestion that anything had gone wrong. He assumed that the statements in the parent company's prospectus were correct and believed the statements in the documents which were produced.

In December, 1929, he discovered that trials showed that the bridge was not coming up to its guarantee in the sense that temperature was affecting it, but he was informed that that could be rectified by further research. Later he heard of the failure to produce satisfactory temperature-compensated bridges, and when Mr. Terrell, on return from America, made certain statements to him, witness felt he would be wanting in his duty to his shareholders if he did not move in the matter, and he gave instructions for Counsel to be consulted.

Sir Stafford Cripps asked witness if he obtained any assurance from anyone in authority with the parent company that what a demonstrator told him might be accepted as a basis of negotiation. Witness replied in the negative, but in view of the fact that they were in negotiation with the parent company he assumed that the demonstration was by its authority.

The case is proceeding.